

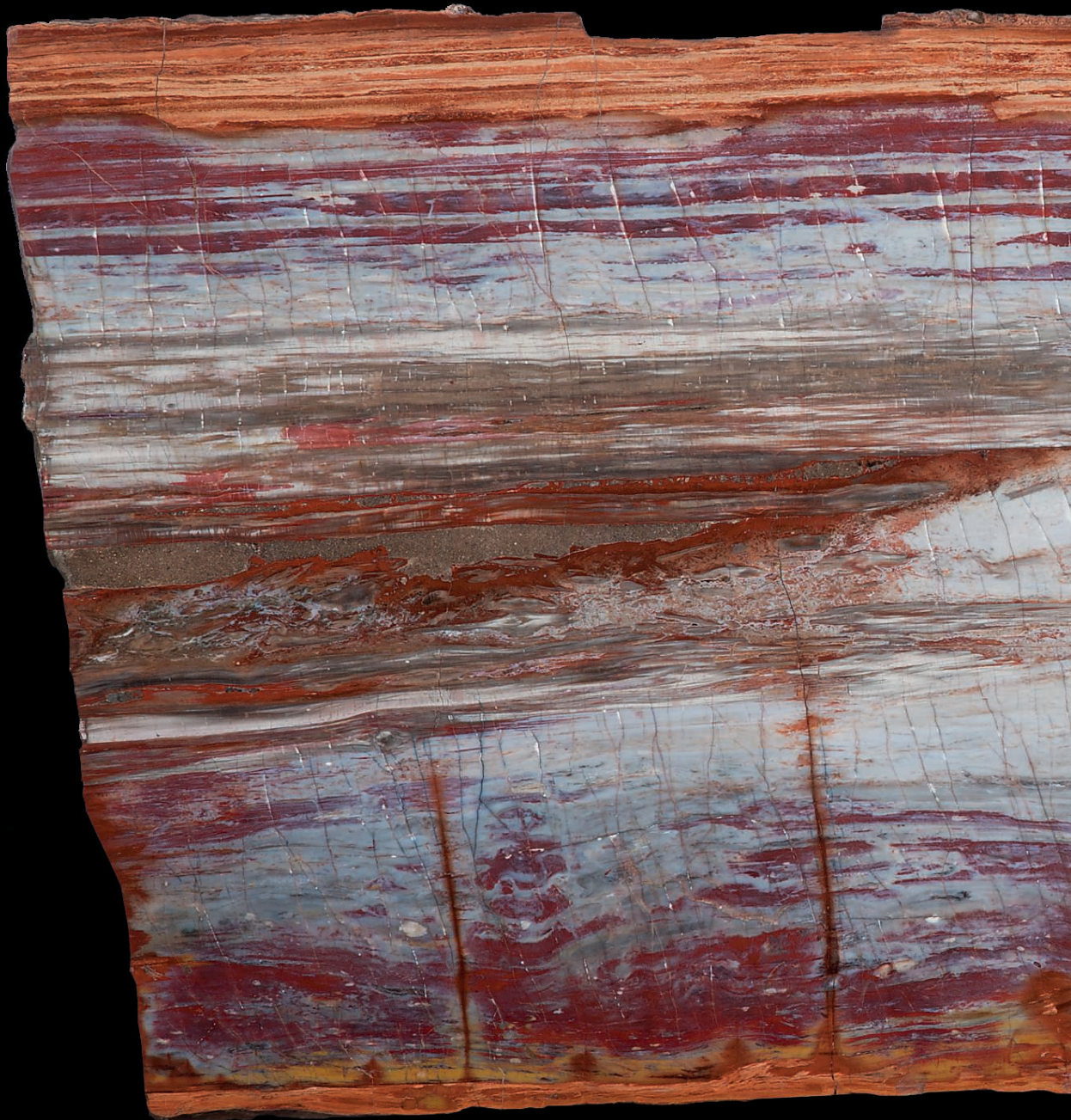


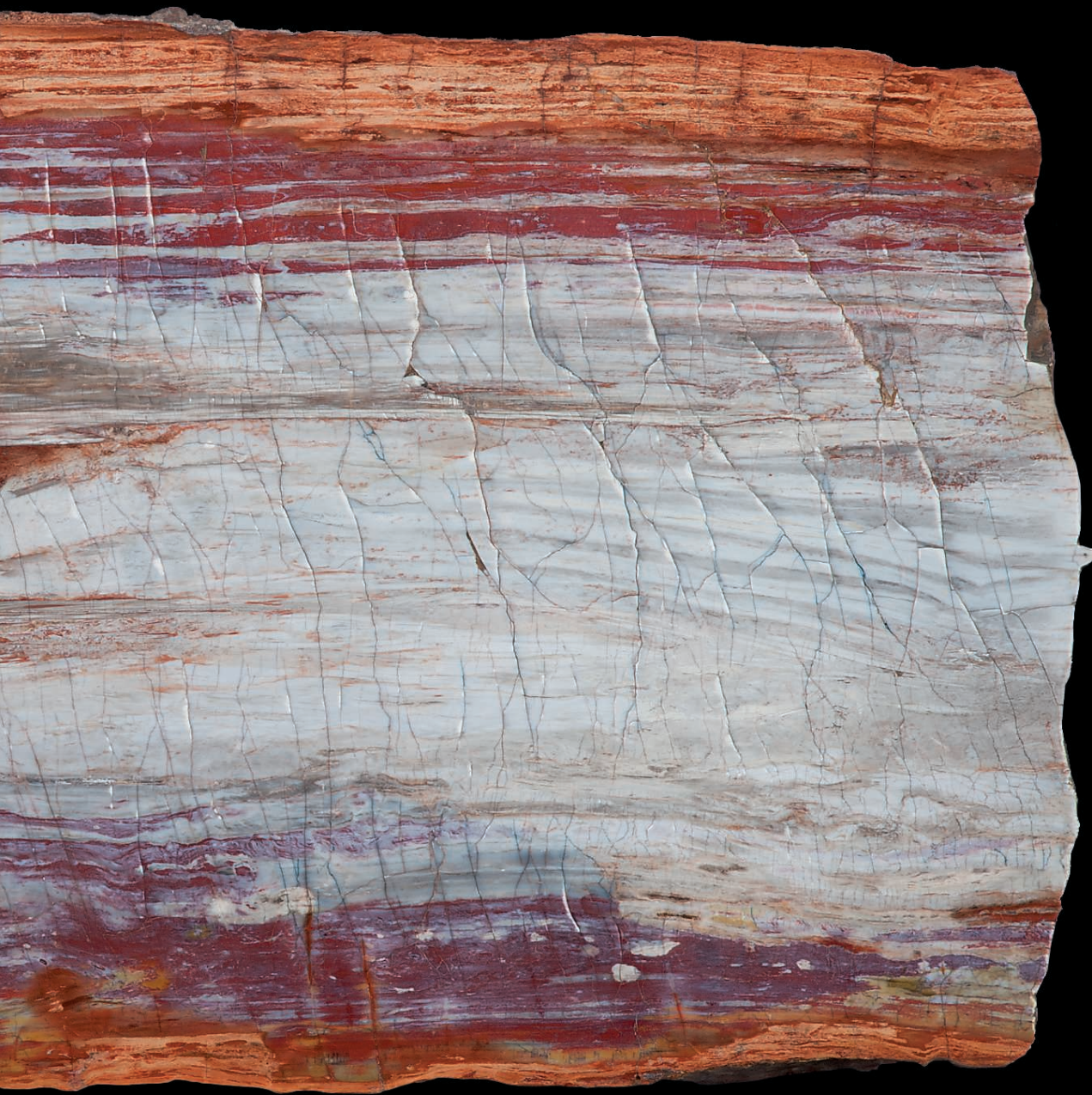
SCIENCE & NATURAL HISTORY

South Kensington

19 October 2016

CHRISTIE'S





INTERNATIONAL PRINTED BOOKS AND MANUSCRIPTS & SCIENTIFIC INSTRUMENTS DEPARTMENTS

INTERNATIONAL HEAD OF GROUP

Margaret Ford
Tel: +44 (0)20 7389 2150

INTERNATIONAL MANAGING DIRECTOR - BOOKS AND SCIENCE AND WORLD ART

Daniel Gallen
Tel +44 (0)20 7389 2590

INTERNATIONAL DIRECTOR

Francis Wahlgren
Tel: +1 212 636 2661

INTERNATIONAL CONSULTANT

Felix de Marez Oyens
Tel: +33 1 40 76 85 58

BOOKS AND MANUSCRIPTS

LONDON

Margaret Ford
Thomas Venning
Kay Sutton
Sven Becker
Julian Wilson
Eugenio Donadoni
Stefania Pandakovic
Sophie Hopkins

CONSULTANTS

Jane Flower (Archives)
Catherine Reynolds
(Illuminated Manuscripts)
Moshe Brown (Hebraica)
Rupert Neelands

NEW YORK

Francis Wahlgren
Chris Coover
Ian Ehling
Gretchen Hause
Tel: +1 212 636 2665

PARIS

Isabelle de Conihout
Patricia de Fougerolle
Philippine de Saily
Emilie Fabre (Bande Dessinée)
Tel: +33 (0)1 40 76 85 99

SCIENTIFIC INSTRUMENTS AND NATURAL HISTORY

SOUTH KENSINGTON

James Hyslop
Tel: +44 (0)20 7752 3205

BUSINESS MANAGERS

Regional Managing Director New York

Ross Elgie
Tel: +1 212 636 2641

London

Julia Grant
Tel: +44 (0)207 752 3113

France

Marie Faiola
Tel: +33 (0)1 40 76 86 10

01/09/16

AUCTION CALENDAR 2016

To include your property in these sales please consign ten weeks before the sale date. Contact the specialists or representative office for further information.

19 OCTOBER
**SCIENCE AND NATURAL
HISTORY**
SOUTH KENSINGTON

1-10 NOVEMBER
MAPPING THE GLOBE
ONLINE SALE

19 NOVEMBER
BANDE DÉSSINÉE
PARIS

30 NOVEMBER
**THE GIANCARLO
BELTRAME LIBRARY
OF SCIENTIFIC BOOKS
PART II**
KING STREET

Subject to change.

1 DECEMBER
**VALUABLE PRINTED
BOOKS AND
MANUSCRIPTS**
KING STREET

14 DECEMBER
**FINE PRINTED BOOKS
AND MANUSCRIPTS
INCLUDING AMERICANA**
NEW YORK

01/09/16



James Hyslop



Julian Wilson



Robert Tyrwhitt

SCIENCE & NATURAL HISTORY

WEDNESDAY 19 OCTOBER 2016

AUCTION

Wednesday 19 October 2016
at 10.30 am Lots 1-223
85 Old Brompton Road
London SW7 3LD

AUCTION CODE AND NUMBER

In sending absentee bids or making enquiries, this sale should be referred to as **CELESTITE-12052**

VIEWING

Saturday	15 October	11.00 am - 5.00 pm
Sunday	16 October	11.00 am - 5.00 pm
Monday	17 October	9.00 am - 7.30 pm
Tuesday	18 October	9.00 am - 5.00 pm

AUCTIONEERS

Kate Flitcroft and Nick Orchard

STORAGE AND COLLECTION

Please refer to the important notice on page 153. Please note that Cadogan Tate's opening hours are Monday to Friday 9am to 5pm, and purchases transferred to their warehouse are not available for collection at weekends.

SPECIALISTS

James Hyslop (Head of Department)
Tel: +44 (0)20 7752 3205
Julian Wilson (Books)
Tel: +44 (0)20 7389 2157

BUSINESS MANAGER

Julia Grant
Tel: +44 (0)20 7752 3113

SALE COORDINATOR

Robert Tyrwhitt
Tel: +44 (0)20 7389 2151

EMAIL

First initial followed by last name
@christies.com (eg. Robert Tyrwhitt =
rtyrwhitt@christies.com.)
For general enquiries about this auction,
email should be addressed to the
sale coordinator.

Front cover: Lot 23
Inside front cover: Lot 59
Page 160: Lot 71 (detail)
Inside back cover: Lot 67 (detail)
Back cover: Lot 158

SERVICES

ABSENTEE AND TELEPHONE BIDS

Tel: +44 (0)20 7752 3225
Fax: +44 (0)20 7581 1403

AUCTION RESULTS

Tel: +44 (0)20 7839 9060
christies.com

CLIENT SERVICES

Tel: +44 (0)20 7839 9060
Fax: +44 (0)20 7389 2869
Email: info@christies.com

POST-SALE SERVICES

Noemie Glardon
Post-Sale Coordinator
Payment, Shipping, and Collection
Tel: +44 (0)20 7752 3200
Fax: +44 (0)20 7752 3300
Email: PostSaleUK@christies.com

CONDITIONS OF SALE

This auction is subject to Important Notices,
Conditions of Sale and to Reserves

BUYING AT CHRISTIE'S

For an overview of the process,
see the Buying at Christie's section.

[15]

christies.com



Browse this auction and view
real-time results on your iPhone,
iPod Touch, iPad and Android

These auctions feature

CHRISTIE'S LIVE

Bid live in Christie's salerooms worldwide
register at christies.com

COPYRIGHT NOTICE

No part of this catalogue may be reproduced,
stored in a retrieval system or transmitted by any
form or by any means, electronic, mechanical,
photocopying, recording or otherwise, without
the prior written permission of Christie's.
© COPYRIGHT, CHRISTIE, MANSON &
WOODS LTD. (2016)

View catalogues and leave bids online
at christies.com

CHRISTIE'S

FOSSILS AND MINERALS (LOTS 1-174)



1

1
A SLICE OF PETRIFIED WOOD
MADAGASCAR

Araucaria sp. from the Triassic
(circa 225 million years ago)
16½in. (42cm.) wide

£1,500-2,500

\$2,300-3,800
€2,200-3,500



2

2
A LARGE AMMONITE
MADAGASCAR

Kranaosphinctes rabei from the Jurassic (201-145 million
years ago)
20in. (41cm.) diameter

£2,500-3,500

\$3,800-5,300
€3,600-4,900



3

3
A FOSSIL SEA URCHIN
MOROCCO

Gymnocidaris koehlin from the Bajocian, Jurassic
(circa 170 million years ago)
5in. (13cm.) wide

£750-1,250

\$1,200-1,900
€1,100-1,800

4
A FOSSIL CRAB
ITALY

Harpactocarcinus sp. from the Eocene (56-38 million years ago) the well preserved specimen with eight legs
9in. (23cm.) wide

£4,000-6,000

\$6,100-9,000
€5,700-8,400



4



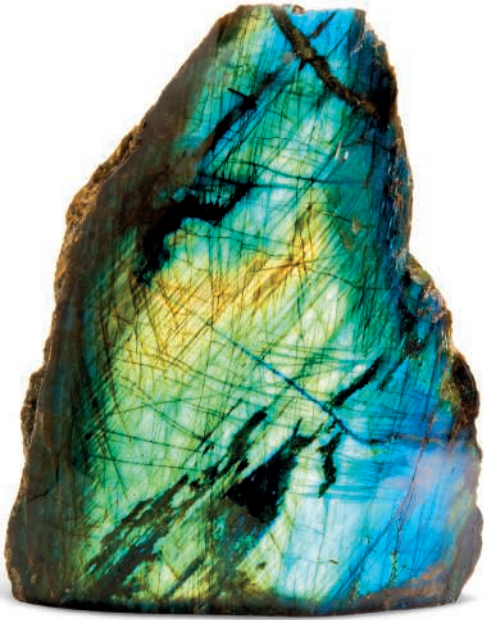
5

5
A SPHERE OF ZEBRA JASPER
MADAGASCAR

the 6½-inch sphere on a stand

£2,500-3,500

\$3,800-5,300
€3,600-4,900



6

6
A SPECIMEN OF LABRADORITE
MADAGASCAR

the front polished side with strong flashes of iridescence
11½in. (24cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500



7

7
A SPECIMEN OF LABRADORITE
MADAGASCAR

the free form polished on all sides showing iridescence
11in. (28cm.) wide

£2,500-3,500

\$3,800-5,300
€3,600-4,900

8
A RIBBED AMMONITE
MADAGASCAR

Euaspidoceras sp. from the Middle Jurassic

(174-163 million years ago) on acrylic base

16in. (41cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500



8

9
AN ENGLISH IRIDESCENT AMMONITE
SOMERSET

Caloceras johnstoni from the Hettangian, Jurassic

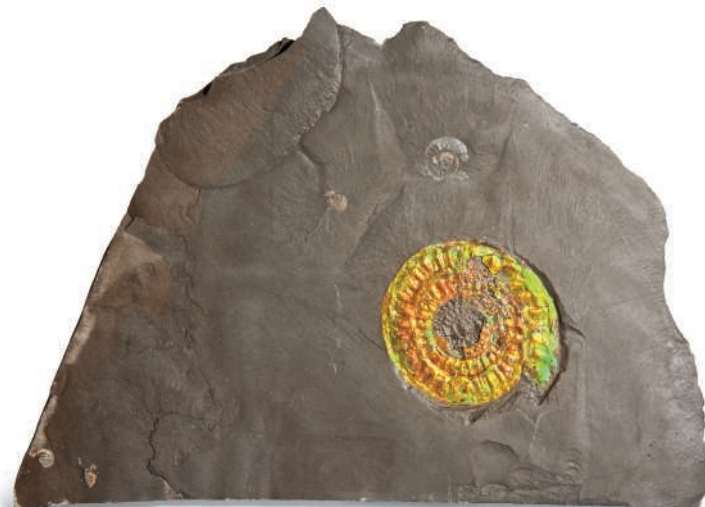
(circa 200 million years ago)

12in. (31cm.) wide

£1,000-1,500

\$1,600-2,300

€1,500-2,100



9

10

A LARGE POLISHED AMMONITE

MADAGASCAR

Douvilleiceras sp. from the Cretaceous

(145–66 million years ago)

15in. (38cm.) diameter

£3,000–5,000

\$4,600–7,500

€4,300–7,000



•*11

A VERY LARGE MEGALODON TOOTH

NORTH CAROLINA, USA

6½ inch tooth of *Carcharodon* sp. from the Tortonian (12–7 million years ago)

7½in. (19cm.) tall on stand

£3,000–5,000

\$4,600–7,500
€4,300–7,000





*12

A LARGE MEGALODON TOOTH
NORTH CAROLINA, USA

6 inch *Carcharodon* sp. from the Tortonian (12-7 million years ago)
7in. (18cm.) tall on stand

£1,000-1,200

\$1,600-1,800
€1,500-1,700



13

13
A FOSSIL STAR FISH PLAQUE
 MOROCCO

specimens of *Protospaleaster sp.* from the Ordovician (485-443 million years ago) in their original matrix supported on stand
 23in. (59cm.) wide

£800-1,200

\$1,300-1,800
 €1,200-1,700



14

14
AN ICHTHYOSAUR PADDLE
 LYME REGIS

from the early Jurassic (200-175 million years ago), the 10-inch long right fore-limb of an *Ichthyosaurus sp.*
 11 x 17½in. (28.5 x 45cm.)

£1,000-1,500

\$1,600-2,300
 €1,500-2,100



15

15
A SPECIMEN OF CALCITE
HUNAN, CHINA

of natural form
6½in. (16.5cm.) long

£2,000-3,000

16
A QUARTZ CLUSTER
MINAS GERAIS, BRAZIL

of natural form
23in. (58cm.) wide

£2,000-3,000

\$3,100-4,500
€2,900-4,200

\$3,100-4,500
€2,900-4,200

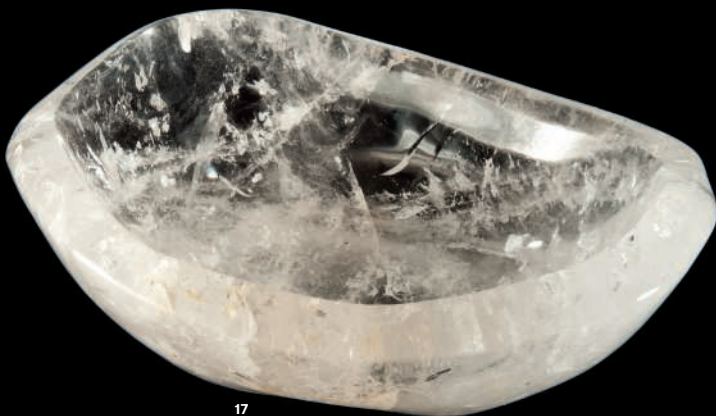


16

17
A SPECIMEN OF QUARTZ
BRAZIL

of bowl form, cut from one piece
and polished
1 5/8 in. (38cm.) wide

£1,500-2,500 \$2,300-3,800
€2,200-3,500



17



18

18
THREE QUARTZ SPHERES
BRAZIL

the largest with 4-inch diameter
4 in. (10cm.) diameter (3)

£700-1,000 \$1,100-1,500
€980-1,400

19
PYRITE WITH QUARTZ
PERU

the crystals of quartz snowflaking
around the pyrite, on fitted stand.
16 in. (41cm.) wide

£1,000-1,500 \$1,600-2,300
€1,500-2,100



19



20

20
SPECIMENS OF FOSSILIZED
SCALLOPS
SOUTHERN FRANCE

Pecten maximus from the Miocene
(23–5 million years ago) the
specimens of up to 6½-inch long
23 x 21 in. (58 x 53 cm.)

£1,000–1,500

\$1,600–2,300
€1,500–2,100

■ **21**
SPECIMENS OF FOSSILIZED
SCALLOPS
SOUTHERN FRANCE

Pecten maximus from the Miocene
(23–5 million years ago) supported
on marble base
21 in. (53 cm.) wide

£1,000–1,500

\$1,600–2,300
€1,500–2,100



21



■22

A LARGE PLAQUE OF FOSSILIZED SCALLOPS
SOUTHERN FRANCE

Pecten maximus up to 6½-inches long, from the Miocene
(23–5 million years ago)
50 x 39 x 11 in. (127 x 99 x 28 cm.)

£5,000–8,000

\$7,600–12,000
€7,100–11,000

Preserved in their final pose, these fossil *Pectens*, are the ancestors of today's modern (edible) scallop. Their surrounding host rock has been carved away to reveal their detail.

GOGOTTES (LOTS 23-27)

These sandstone concretions formed in mineral rich waters 30 million years ago, gogottes are much prized for their sculptural-like appearance.



23

A GOGOTTE FORMATION
FONTAINEBLEAU, FRANCE

of natural form, from the Oligocene (circa 30 million years ago)
12in. (30cm.) high

£3,500-5,500

\$5,300-8,300
€5,000-7,700



24

A GOGOTTE FORMATION
FONTAINEBLEAU, FRANCE

of natural form, from the Oligocene (circa 30 million years ago), supported
on stand

22in. (56cm.) high

£3,000-5,000

\$4,600-7,500
€4,300-7,000



25

A GOGOTTE FORMATION
FONTAINEBLEAU, FRANCE

of natural form, from the Oligocene
(circa 30 million years ago),
supported on stand
20in. (51cm.) high

£6,000–8,000

\$9,100–12,000
€8,500–11,000



26
A GOGOTTE FORMATION
FONTAINEBLEAU, FRANCE

of natural form, from the Oligocene (circa 30 million years ago)
17in. (44cm.) high

£2,000-3,000

\$3,100-4,500
€2,900-4,200



■ 27

A LARGE GOGOTTE FORMATION

FONTAINEBLEAU, FRANCE

of natural form with many layers of concretions

21 in. (54cm.) high

£6,000-9,000

\$9,100-14,000

€8,500-13,000



28

AN INTACT ELEPHANT BIRD EGG

MADAGASCAR, PRE-17TH CENTURY

a complete egg of an *Aepyornis maximus*, some material can be heard rattling inside the egg

1 1/4in. (28 1/2cm.)

£40,000-60,000

\$61,000-90,000

€57,000-84,000

The Elephant Bird was thought to be the giant flying beast known as the Roc (or Ruhk) in the tales of Sinbad and accounts of Marco Polo's voyages. The bird grew to around 10 or 11 feet in height and whilst probably unable to devour an elephant, as the Roc was reputed to do, it certainly was the largest bird ever to have lived. It was estimated to weigh up to 1100lbs (the largest ostriches might grow to 8 feet in height and weigh 300lbs).

The birds are thought to have gone extinct between the 14th and 17th centuries.





***29**

A SMALL ORIENTED CHELYABINSK METEORITE

LL5

CHELYABINSKAYA OBLAST, RUSSIA (54°49' N, 61°07' E)

While this is a modestly sized oriented meteorite compared to the previous lot, every feature of orientation is evident: parabolic cone, flow lines, regmaglypts, an ablation lip and evidence of bubbling on the reverse. On the obverse an evocation of a face similar to the character Kuato in the film *Total Recall*.

39 x 37 x 17mm (1½ x 1½ x ⅙in.)

45.1g

£2,000-3,000

\$3,100-4,500

€2,900-4,200

LITERATURE:

Klotz, I. (2014), "Russian Meteor: Chelyabinsk Asteroid Had Violent Past." *Discovery*. Accessed November 5, 2015.

Dorminey, B. (2015), "NASA Surprised By Chelyabinsk Russian Meteor Fragments." *Forbes*. Accessed November 5, 2015

This is a smaller oriented meteorite from the Chelyabinsk meteorite shower—and as is the case with the previous lot, less than 1% of all meteorites exhibit this degree of orientation. As a result of the damage created by Chelyabinsk, scientists are racing to come up with a comprehensive global strategy to protect Earth from a larger bombardment. About 13,000 Near-Earth Objects (NEOs) like the Chelyabinsk parent body have been discovered to date; nearly 900 of them are a kilometer in diameter or larger. More than 1600 of these bodies have been officially classified as "Potentially Hazardous Asteroids." Chelyabinsk is a member of the least-common ordinary-chondrite group—the LL chondrites. It wandered through interplanetary space for a scant 1 million years, which suggests that Chelyabinsk was derived from the recent disruption of a small Earth-crossing asteroid that was itself broken off the main LL parent asteroid in the more-distant past. During one or more of these collisional events, Chelyabinsk was significantly shocked; pools of impact melt have been documented in numerous specimens.



***30**

**NWA 108 – THE MAIN MASS OF A SAHARAN METEORITE
THE INTERIOR AND EXTERIOR REVEALED**

L6

SAHARA DESERT, NORTH WEST AFRICA

This trapezoidal-shaped specimen exhibits a variegated tan to milk chocolate matrix featuring three unusually large light-colored inclusions. About 80% of the reverse is covered in fusion crust with terrestrialized fractured surfaces. Accompanied by a custom armature.

193 x 203 x 85mm (7½ x 8 x 3⅓in.)

5.68kg (12.5lbs)

£3,000-5,000

\$4,600-7,500
€4,300-7,000

PROVENANCE:

Philip C. Mani Collection

To enable scientists to refer to the unique attributes of a given meteorite, there must be a nomenclature system, and so a committee of scientists name meteorites after the location to which they've been "delivered," (e.g., a city, village, mountain, river, county, etc.). In a desert, where there are few distinguishing geological features, meteorites are named after a grid encompassing a restricted area and are assigned a sequential number.

As can be inferred from its very low number, the meteorite now offered is among the earliest meteorite recoveries since the advent of the grid system in 1999. NWA 108 is an L6 chondrite, indicating that it has a relatively low amount of iron and has been extensively metamorphosed on its parent asteroid. Its chondrules were recrystallized and the constituent minerals became compositionally uniform. This is the main mass of NWA 108, i.e., it is the largest portion of this meteorite in existence. The warm, earthy hues seen in the matrix are the result of *terrestrialization* (exposure to the elements as for an extended period of time).



***31**

STRATHMORE METEORITE – THICK SLAB FROM A 1917 SCOTTISH FIREBALL

L6

PERTHSHIRE, SCOTLAND (56°35' N, 3°15' W)

With two edges of fusion crust along with one cut and one crenulated edge, a creamy matrix is accented by terrestrial tinting along with fresh metal scattered throughout. Modern cutting.

57 x 57 x 9mm (2¼ x 2¼ x ⅓ inches)

95.9 grams

£7,000–10,000

\$11,000–15,000

€9,900–14,000

PROVENANCE:

Natural History Museum, London

Following the appearance of a brilliant fireball on December 3, 1917 that entered the atmosphere east of Dunbar, Scotland and passed over Fife and the Sidlaws Hills where it broke apart in the sky, four stones weighing a total of approximately 13 kg were recovered. Three of the stones were found in Perthshire at Easter Essendy, Carsie and Keithick, and one stone in Forfarshire at South Corston. As indicated by the L6 designation, Strathmore has a moderately low amount of iron for a chondritic meteorite and its chondrules have been extensively recrystallized when the rock was metamorphosed on its parent asteroid. During this heating process, the mineral grains became compositionally uniform. Nearly 10 kg of Strathmore is at the National Museum of Scotland, where it is most likely to remain.



32

32
**A SPECIMEN OF PICTURE
SANDSTONE**
UTAH, USA

the carved form from the Shinarump
formation
1 1/2 in. (41cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500

33
**THREE SPECIMENS OF ORBICULAR
JASPER**
MADAGASCAR

of spherical form
5 in. (13cm.) largest

(3)

£1,000-1,500

\$1,600-2,300
€1,500-2,100



33



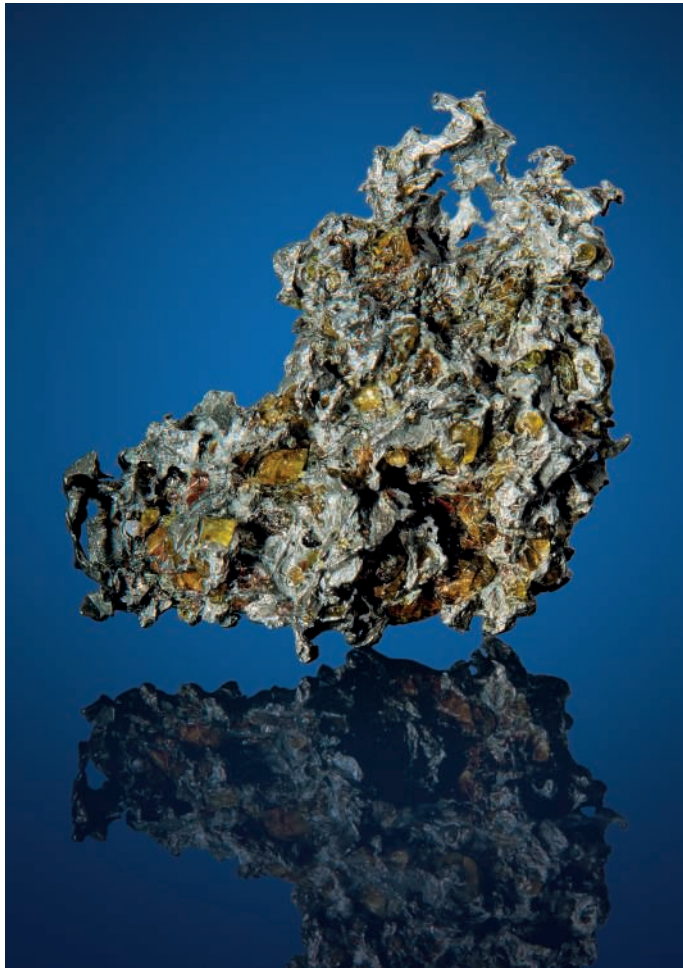
34

34
A LARGE AGATE SLICE
BRAZIL

polished on both sides, maintaining
texture to circumference, supported
on acrylic stand
19 in. (49cm.) wide

£800-1,200

\$1,300-1,800
€1,200-1,700



***35**

AN ADMIRE METEORITE NODULE

DISCOVERED LYON COUNTY, KANSAS, 1881

the specimen shows the green clusters of olivine, embedded in a metallic iron-nickel mass

3½in. (9cm.) long

£3,000-5,000

\$4,600-7,500

€4,300-7,000

Admire is a pallasite formed at the core-mantle boundary of an asteroid that melted about 4.5 billion years ago. Deep inside the asteroid, molten metal from the top of the core mixed with olivine grains (a magnesium-rich silicate mineral) that had crystallized from the mantle and were pulled downwards, towards the core, by the body's modest gravity. Things remained quiet for Admire until a major collision shattered the asteroid roughly 100 million years ago; this event and subsequent, less energetic collisions set some of the pallasites on a collision course with Earth. The first piece of Admire to be found was ploughed up in Lyon County, Kansas in 1881.



***36**

A CUBE OF MUONIONALUSTA METEORITE

DISCOVERED IN NORBOTTEN, SWEDEN, 1906; MODERN CUTTING

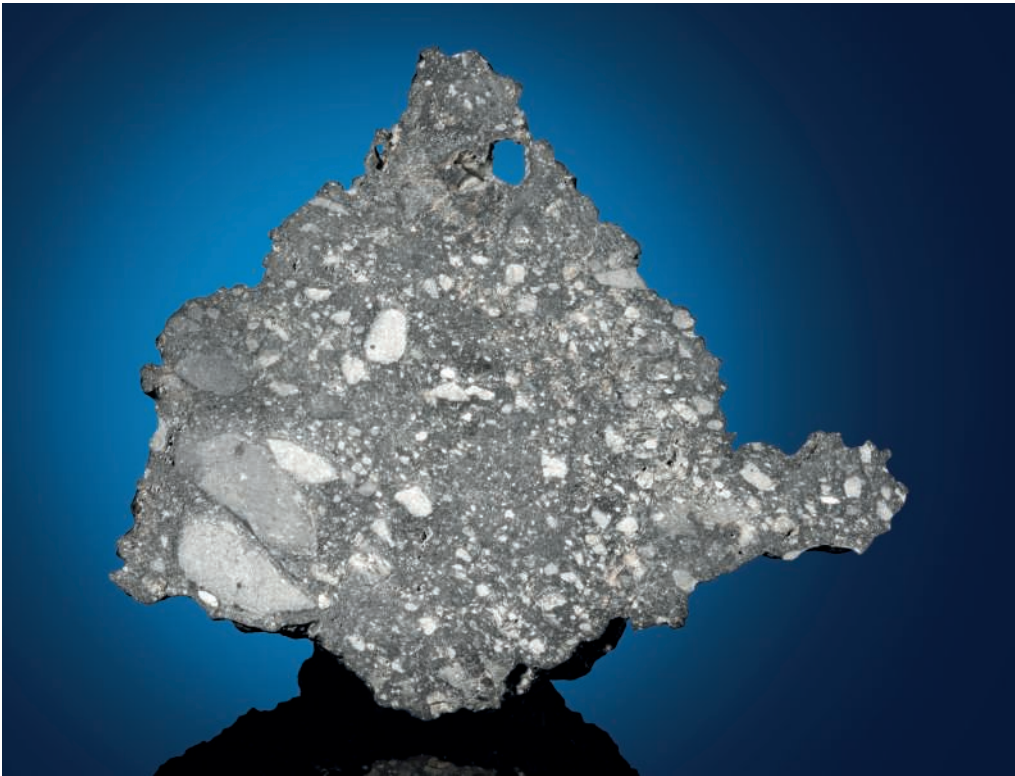
the cut surfaces displaying features a resplendent fine-grained Widmanstätten pattern, the product of the solid-state intergrowth of two different iron-nickel minerals – kamacite and taenite

3in. (7.5cm.) wide

£5,000-9,000

\$7,600-14,000

€7,100-13,000



***37**

**NWA 8306 — INTERIOR AND EXTERIOR OF A MOON
ROCK WITH NATURAL HOLE**

LUNAR METEORITE (FELDSPATHIC, REGOLITHIC BRECCIA)
SAHARA DESERT, NORTH WEST AFRICA

The cut face evidences a galaxy of inclusions, the result of the ongoing pulverizing of the Moon's surface by meteorite impacts prior to the collision responsible for launching this rock to Earth. The highly textured reverse is a result of natural sandblasting by desert winds over a period of centuries. Numerous variables such as the angle at which this rock sat on the desert floor, the direction of the wind and idiosyncrasies of the material itself (allowing softer components to erode out), produced the holes in what is a singular and noteworthy specimen of the Moon. 121 x 101 x 39mm (4¾ x 4 x 1½in.)

305g

£60,000-120,000

\$91,000-180,000

€85,000-170,000

This is a unique end piece of a lunar meteorite, a rock that was ejected from the lunar surface following an asteroid impact. The Moon is among the rarest substances on Earth; there are less than 135 kilograms

known to exist and just 0.4% of all meteorites are of lunar origin. As was mentioned in previous descriptions, Moon rocks are identified by specific textural, mineralogical, chemical and radiation signatures. Many of the common minerals found on Earth's surface are rare on the Moon and some lunar minerals are unknown on Earth. NWA 8306, the 8306th meteorite to be catalogued following its recovery in the Northwest African grid of the Sahara Desert, is a fine example of a feldspathic regolithic lunar breccia — a rock formed at the lunar surface and composed of different fragments of rocks and minerals cemented together by lunar soil and other crushed rock. What sets this specimen apart, however, is that it contains naturally formed holes; these are a sought-after rarity in meteorites, and 99.9% of the time they occur only in iron meteorites. It is virtually unheard of that a naturally formed hole is seen in a stony meteorite—and such is the case in this exceptional sample of the Moon. NWA 8306 was classified by Dr. Anthony Irving, among the world's foremost classifiers of planetary material.



***38**

A SPECIMEN OF BOTRYOIDAL FLUORITE ON QUARTZ

CHINA

of natural form from Dongqiyishan Fluorite deposit, Alxa League, China, the deep blue crystals of fluorite on top of white quartz

8in. (20cm.) wide

£7,000-10,000

\$11,000-15,000

€9,900-14,000

The quartz has a “candle” type formation with many smaller terminations leading toward the top terminations resembling the manner in which a candle drips wax as it burns. The multi-generations of fluorite crystals appear to have grown cubically and then modified into dodecahedrons that now resemble blueberries. A fine example.



***39**
CRYSTALLINE GOLD ON QUARTZ
TUOLUMNE COUNTY, CALIFORNIA

of natural form, from “the Mother Lode”, GG claim, the gold on quartz host matrix

4in. (10cm.) long

£15,000–25,000

\$23,000–38,000
€22,000–35,000



40

***40**

A SPECIMEN OF SMOKY QUARTZ

NAMIBIA

of natural form, from Goboboseb Mountain, Brandberg area, Brandberg District, Erongo Region, the sceptre sharp and lustrous with a cocoa brown colour
3½in. (9cm.) high

£500-800

\$760-1,200
€700-1,100

***41**

FLUORITE CRYSTALS WITH SPHALERITE

TENNESSEE, USA

of natural form, from Elmwood Mine, Carthage, Central Tennessee Ba-F-Pb-Zn District, Smith Co., the brilliant purple crystals of fluorite with a light etching
3½in. (8.3cm.) wide

£1,000-1,500

\$1,600-2,300
€1,500-2,100



41



42

42

RHODOCHROSITE

COLORADO, USA

of natural form, from the Sweet Home Mine, Mount Bross, Alma District, Park Co., numerous cherry red rhombohedrons of rhodochrosite, over a terminated Quartz crystals and lavender fluorite cubes
3in. (8cm.) wide

£3,000-5,000

\$4,600-7,500
€4,300-7,000



***43**

A SPECIMEN OF "BISBEE" AZURITE

ARIZONA, USA

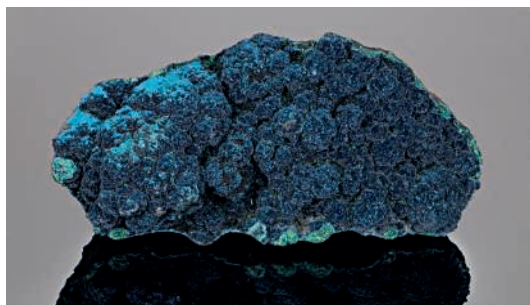
of natural form, Copper Queen Mine, Bisbee, Warren District, Mule Mts, Cochise Co., bubbling microcrystalline azurite dotted with light green malachite 5¼in. (13.5cm.) high

£2,500-3,500

\$3,800-5,300

€3,600-4,900

A rare mineral, the mine from which it came has been closed for half a century. The rich royal blue colour indicates that this is indeed an early specimen from this famed mining district.



***44**

A SPECIMEN OF CORNETITE

of natural form, from the Star of the Congo Mine, Katanga, rich, intensely blackish blue to a rich teal blue and bright, lustrous rosettes cover the display side of this specimen.

6¼in. (16cm.) wide

£4,000-6,000

\$6,100-9,000

€5,700-8,400

This relatively rare copper phosphate reaches its zenith at the Star of Congo Mine - and occurs in such quality nowhere else on earth. These micro-crystals combine to form little crystal balls with an incredible sparkle. This specimen has excellent aesthetics and is in remarkably fine condition. The intensity of the colour marks it as being from the now-famous find of the 1998 pocket of this "best of" material, brought out at the time by the Belgian dealer Gilbert Gauthier.



45

•*45

A SPECIMEN OF CAVANSITE ON STILBITE

INDIA

of natural form, from Pune District , Maharashtra

4½in. (11cm.) high

£800-1,200

\$1,300-1,800

€1,200-1,700



46

•*46

A SPECIMEN OF AMAZONITE

ETHIOPIA

of natural form, the large group of parallel crystals from

Kenticha Mine, Sidamo-Borana Province,

5in. (13cm.) wide

£600-900

\$910-1,400

€840-1,300



***47**

A SPECIMEN OF AQUAMARINE

BRAZIL

of natural form, a single, tall aquamarine crystal from Doce Valley, Minas Gerais

5½in. (13.5cm.) long

£6,000-9,000

\$9,100-14,000

€8,500-13,000

A rare survival: the high amount “gem grade” material in this piece would usually have seen it selected for cutting into one or more gemstones to be used in jewellery, had it not been rescued by a mineral enthusiast.

***48**

A CELESTITE GEODE
MADAGASCAR

of concave form, a fine specimen from Sakoany mine,
Katsepy Commune, Mitsinjo Department, Boeny
Region, Mahajanga Province,
11 in. (28cm.) wide

£3,500-4,500

\$5,300-6,800
€5,000-6,300



48



49

***49**

A STALACTITE OF CALCITE ON QUARTZ
INDIA

of natural form, from Paldhi, Jalgaon District,
Maharashtra
9 in. (23cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500



50

***50**
A QUARTZ SPECIMEN
INDIA

of natural form, from Paldhi, Jalgaon District,
Maharashtra,
8¾in. (22cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500

***51**
A SPECIMEN OF AQUAMARINE
PAKISTAN

of natural form, a grouping of intergrown blue
aquamarine crystals situated on a bed of muscovite mica,
from Gilgit-Baltistan
6¼in. (16cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500



***52**

A DOUBLY TERMINATED CRYSTAL OF AQUAMARINE
PAKISTAN

of natural form, on muscovite from Nagar, Hunza
Valley, Gilgit District,
3½in. (9cm.) wide

£4,000-6,000

\$6,100-9,000

€5,700-8,400

This barrel-shaped, example of a gem aquamarine crystal was collected in the 1990s and exemplifies crystallographic perfection of the sharp hexagonal shape, perfect symmetries, and lovely colour. It has no damage, and is complete all around. Perched perfectly on a small amount of natural matrix to make a natural pedestal for display.



53

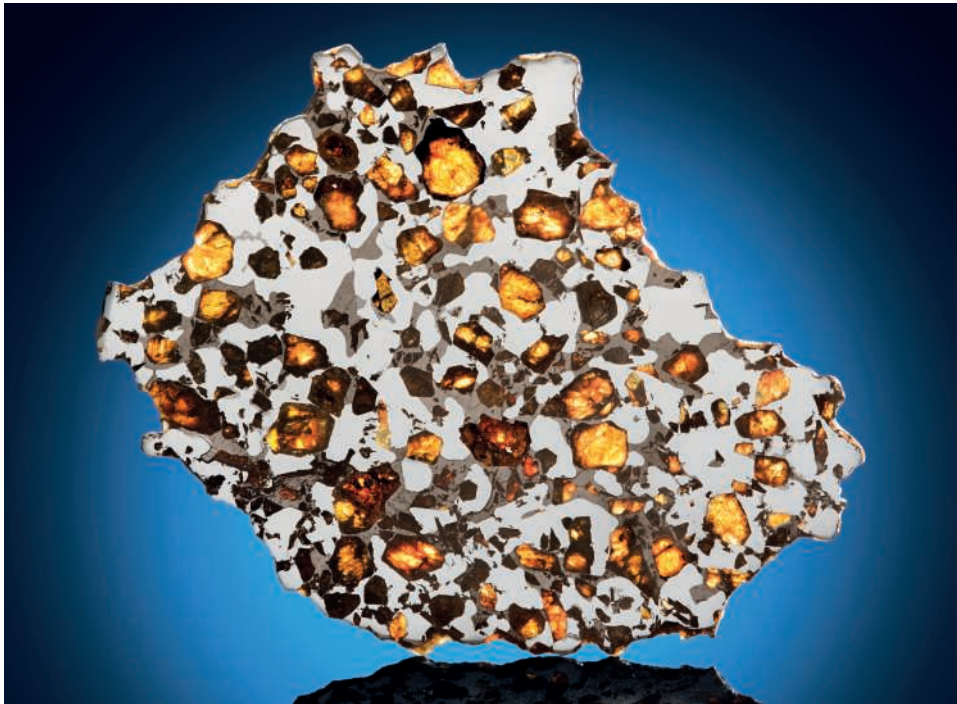
A SPECIMEN OF MALACHITE AND SHATTUCKITE
NAMIBIA

of natural form, the malachite bridging across the quartz
grouping, from Kaokoveld Mine, Kaokoveld Plateau,
Kunene Region,
3in. (8cm.) wide

£2,500-3,500

\$3,800-5,300

€3,600-4,900



*54

GLORIETA MOUNTAIN PALLASITE — A SUPERB COMPLETE SLICE FROM THE SCHONER MASS

STONY-IRON - PAL-ANOM

GLORIETA MOUNTAIN, NEW MEXICO

This specimen features the signature sulfide inclusions of this meteorite along with crystals of olivine and *peridot* (the semi-precious birthstone of August) suspended in a highly polished metallic matrix. This is among the finest complete slices of the Glorieta Mountain pallasite known to exist.

203 x 169 x 3mm (8 x 6½ x ¼in.)

357g

£6,000-9,000

\$9,100-14,000

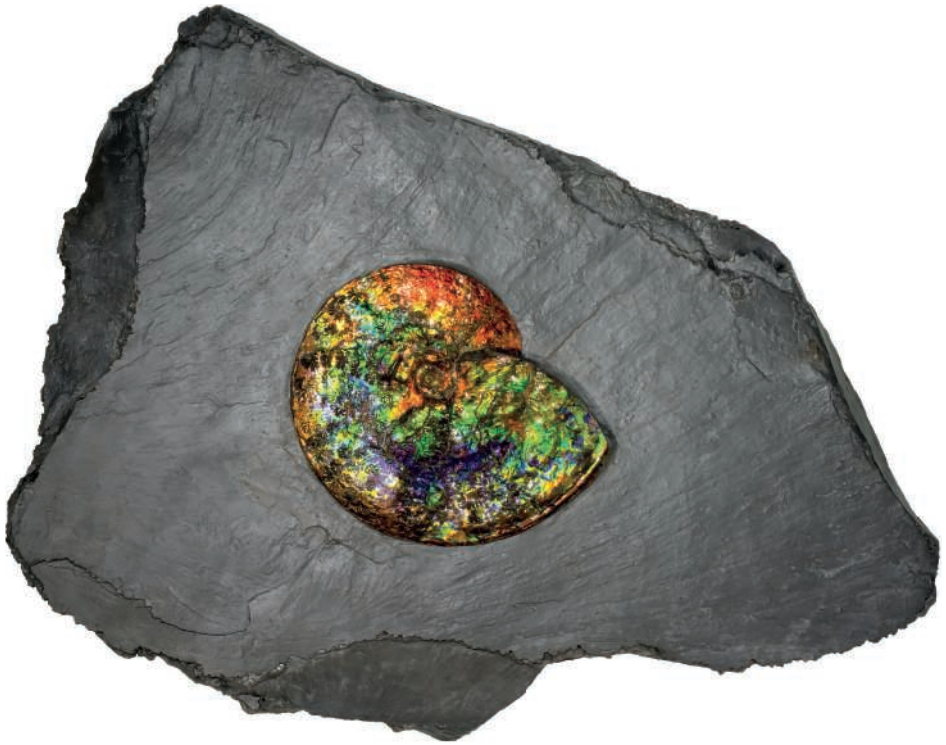
€8,500-13,000

PROVENANCE:

Steve Schoner Meteorite Collection, Clyde Tombaugh House, Flagstaff, Arizona

The complete slice of Glorieta Mountain now offered was adjacent to the slice whose image served as the frontispiece of the *Cambridge Encyclopedia of Meteorites*. Less than 0.2% of all meteorites are pallasites — the

most resplendent of all meteorites — and Glorieta Mountain is the most famous American pallasite. In 1965 the “Father of Meteoritics”, Harvey Nininger, befriended a teenaged Steve Schoner and informed him of the small meteorites found on Glorieta Mountain in northern New Mexico. Years later, Schoner’s recovery of tiny pallasitic fragments fueled his belief in the existence of a far larger mass — a Holy Grail to meteorite enthusiasts. After seventy searches of two to three weeks each over a period of 15 years, Schoner’s efforts finally paid off. The stunning specimen now offered is from the 20 kg meteorite recovered by Schoner. As a result of the material lost from cutting, grinding and polishing, only 11 kg of fine specimens from this historic mass exist. While pallasites are extremely rare, Glorieta Mountain is rarer still because it is chemically and morphologically anomalous. It also has a relatively high abundance of iron sulfide (the mineral troilite), leading researchers to classify Glorieta as an anomalous member of the main pallasite group.



***55**

AN IRIDESCENT AMMONITE

CANADA

the 10½ inch *Placenticerus costatum* from the upper Cretaceous, Bearpaw formation (75-72 million years ago), showing strong iridescences of red, orange, green, purple

30 x 23½in. (76 x 61cm.)

£15,000-25,000

\$23,000-38,000

€22,000-35,000



(detail)

The opal like iridescence of these ammonites from Alberta, Canada has been termed ammolite and since 1981 has had the status of a gemstone. The shimmering, metallic colours were caused by the combination of millions of years of compression and the mineralization of iron, copper and silica which precipitated from volcanic ash. The opalescent layers of colour are particularly prized in the Chinese philosophical system of Feng-Shui.

The ammonites are a group of molluscs that lived in the seas from the mid-Devonian (approximately 400 million years ago) to the end of the Cretaceous (65 million years ago). The sequence of events that famously killed off the dinosaurs also drove the ammonites to extinction.



■*56

A LARGE FOSSIL FISH PLAQUE
GREEN RIVER WYOMING

from the Eocene (circa 50 million years ago), the panel with 35 placed fossil fish of various species, the largest a *Diplomystus dentatus*
54 x 42in. (138 x 107cm.)

£3,500-5,000

\$5,300-7,500
€5,000-7,000



57

*57

BANDED IRON TIGER EYE SPECIMEN

MT BROCKMAN STATION, AUSTRALIA

from the early Proterozoic (circa 2.5 billion years ago)
the panel of Marra Mamba iron formation cut and
polished in the form of a table top
24½ x 16½in. (75 x 42 cm.)

£4,000-6,000

\$6,100-9,000
€5,700-8,400

Found only in the blue crocidolite seams of the Hamersley Range in the Pilbara region of Western Australia, this highly iridescent ironstone, Marra Mamba, is amongst the rarest and most colourful of all Tiger-eye. Probably stromatolitic in origin, this fossil is amongst the earliest signs of life on Earth, and as a semi-precious stone is also one of the most beautiful.

58

A FOSSIL FISH AND LEAF PLAQUE

GREEN RIVER, WYOMING

from the Eocene (circa 50 million years ago) the
Diplomystus dentatus with a *Priscara* sp. naturally overlying
a branch of a *Populus* sp. (?)

47 x 18¾in. (120 x 47.5cm.)

£6,000-8,000

\$9,100-12,000
€8,500-11,000



58

■59

A LARGE SLICE OF PETRIFIED WOOD

NORTHERN ARIZONA

Araucarioxylon arizonicum from the Triassic (circa 225 million years ago) sliced longitudinally and polished to reveal a rainbow of colours, in table top form, on two supporting stands

59 x 33 x 22in. (150 x 84 x 56cm.)

£18,000–25,000

\$28,000–38,000

€26,000–35,000

LITERATURE:

cf. Dernbach, U., *Petrified Forests* (Heppenheim: 1996).

Please see the front endpapers for an alternative view of this lot



60
AN AGATE GEODE
BRAZIL

cut and polished to one side
16½in. (42cm.) wide

£800-1,200

\$1,300-1,800
€1,200-1,700



60



61

61
SPECIMENS OF PETRIFIED WOOD
INDONESIA

the eight polished spheres of various sizes, the largest
6½-inches diameter

6½in. (16cm.) diameter the largest

(8)

£2,000-3,000

\$3,100-4,500
€2,900-4,200

62
APOPHYLLITE SPECIMEN
NASHIK, INDIA

mounted vertically on custom acrylic base
9in. (23cm.) high

£700-1,000

\$1,100-1,500
€980-1,400



62

63
A CRYSTAL OF CALCITE
MADAGASCAR

The 5-inch crystal rhombohedron exhibiting double diffraction, supported on custom stand
6in. (15cm.) high

£700-1,000

\$1,100-1,500
€980-1,400



63



64

64
PYRITE
SPAIN

the three clusters of cubic crystals free from matrix
4½in. (4cm.) wide

(3)

£700-1,000

\$1,100-1,500
€980-1,400

65
A SPECIMEN OF QUARTZ
BRAZIL

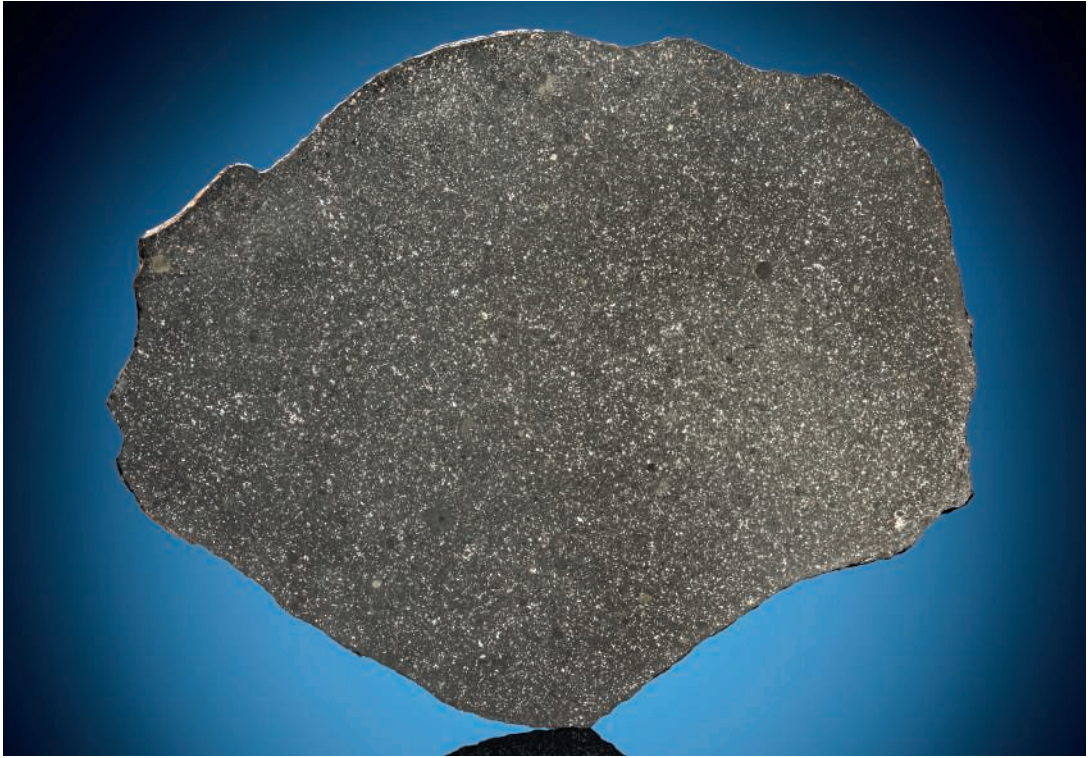
the crystal with prismatic inclusion and natural point, on fitted stand
10in. (25½cm.) high

£700-1,000

\$1,100-1,500
€980-1,400



65



*66

TRAVIS COUNTY (A) A MASSIVE COMPLETE SLICE OF A TEXAN METEORITE

CHONDRITE - H5

TRAVIS COUNTY, TEXAS (30°18' N, 97°42' W)

Cut from the largest of the Travis County (a) masses, now offered is one of the two largest complete slices of this storied Texan meteorite. This large-format slice is festooned with endless metallic flakes as well as numerous dark inclusions scattered throughout the matrix. The outer rim has extensive patches of fusion crust.

463 x 377 x 5mm (18¼ x 14¾ x ½in.)

3.50kg (7.7lbs)

£5,000-8,000

\$7,600-12,000

€7,100-11,000

PROVENANCE:

The Oscar Monnig Collection, Texas Christian University, Fort Worth, Texas

Philip C. Mani Collection

Travis County meteorites found their way into scientific literature when Dr. R. T. Hill of the University of Texas received a 2.5 kg fragmentary mass that he donated to the Smithsonian in 1889. The fragment originated from a ranch in Travis County, home to the state capitol of Austin as well as the university where he worked. Nearly forty years later, celebrated meteorite hunter Oscar Monnig met Dr. Hill and was able to trace the specimen donated to the Smithsonian to the Sunset Ranch in Leander, Texas. Unfortunately, just where the meteorite was found had been long forgotten, so Monnig organized a search of the area and soon located numerous additional masses totaling more than 100 kg. All were believed to have originated from the same event, but in 1995 it was determined — ironically by another Smithsonian researcher — that about 20% of the specimens were of a different meteorite that just happened to fall in the same area and were thus given the name “Travis County (b).”



67

***67**

**PARTIAL SLICE OF NWA 8257 –
THE RAW INGREDIENTS OF THE
PLANETS**

LL3 (PROVISIONAL)

SAHARA DESERT, NORTH WEST
AFRICA

This partial slice contains an abundance of densely packed chondrules with variable textures held together by fine-grained silicate matrix material (compacted nebular dust dating from the earliest stages of solar-system history). The matrix is extremely fresh and is delimited by three cut edges and a natural rim.

99 x 79 x 2mm (3¾ x 3 x ⅛in.)

78.2g

£1,500-2,500

\$2,300-3,800

€2,200-3,500

For further information on this lot please visit www.christies.com



68

***68**

**COMPLETE SLICE OF WILLAMETTE
METEORITE**

IRON - IIIAB

CLACKAMAS COUNTY, OREGON
(45°22' N, 122°35' W)

Willamette's signature recrystallized matrix is contrasted by the smooth, curved rim of the meteorite's exterior. A nodule of troilite with never before seen metallic embayments is in evidence near the top left.

119 x 76 x 1mm (4⅞ x 3 x ⅛ inches)

80 grams

£4,000-6,000

\$6,100-9,000

€5,700-8,400

PROVENANCE:

American Museum of Natural
History, New York City

For further information on this lot please visit www.christies.com

*69

DRONINO — EXTRATERRESTRIAL MINIMALIST SCULPTURAL FORM

IRON, ATAXITE (UNGROUPED)

RYAZAN DISTRICT, RUSSIA (54° 44' N, 41° 25' E)

Accompanied by a custom armature, this is a most uncommon meteorite.

189 x 158 x 57mm (7½ x 6¼ x 2¼in.)

5.75kg (12.6lbs)

£4,000-6,000

\$6,100-9,000

€5,700-8,400

LITERATURE:

Oshtrakh, M., Milder, O., Grokhovsky, V. & Semionkin, V. (2004), "Hyperfine Interactions in Iron Meteorites: Comparative Study by Mossbauer Spectroscopy." *Hyperfine Interactions*, 158(1-4), 365-370

Similar to the previous lot, Dronino is an ungrouped iron meteorite. There is no meteorite that is chemically similar to Dronino, which implies it originated from a previously unknown parent asteroid. This is an unusual specimen as it regards its geometric simplicity. Earth's elements interacted with the meteorite for more than 1000 years, resulting in this minimalist form of two distinct richly textured slopes.

70

A GIBEON METEORITE SPHERE

NAMALAND, NAMIBIA; MODERN CUTTING

This sphere reveals in three dimensions the beautiful *Widmanstätten pattern* that is characteristic of Gibeon specimens

3½in. (9.5cm.) diameter

£7,000-10,000

\$11,000-15,000

€9,900-14,000

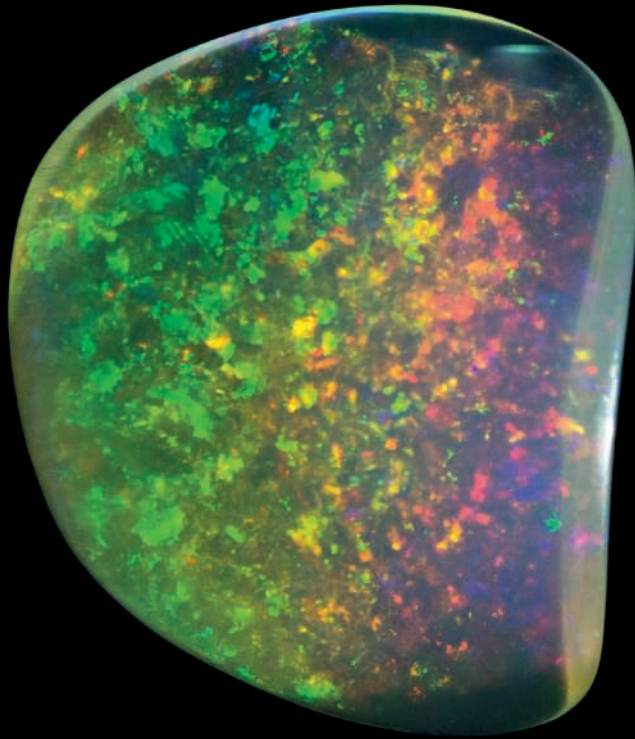
Discovered in 1836 by James Edward Alexander (1803-85), a specimen of the Gibeon meteorite was sent to London, where it was confirmed as a meteorite by the astronomer John Herschel (1792-1871). Later research has determined the fall date to have been between 5,000 and 30,000 years ago. Originating from the molten core of an asteroid and after travelling millions of years in interplanetary space, it fell into Earth's upper atmosphere before exploding and raining down over an elliptical strewn field in what is now Namibia. Due to a relatively high nickel content (8%), Gibeon is ductile and not as prone to oxidizing as most other iron meteorites. Only when cut and etched, the fine octahedral intergrowth of a Gibeon's primary alloys is revealed.



69



70



Ω71

A SPECIMEN OF OPAL

ETHIOPIA

the 612 carat free form polished on all sides, the translucent opal with flashes of fiery colour suspended in body – reds, golds, purples, greens, electric blues, oranges and yellows all present

2³/₄in. (7cm.) long

£15,000–25,000

\$23,000–38,000

€22,000–35,000



***72**

BENITOITE AND NEPTUNITE

SAN BENITO, CALIFORNIA

of natural form from the Dallas Gem Mine, New Idria District, blue benitoite crystals and dark, reddish brown prisms of neptunite crystals on a white natrolite matrix

8½in. (21.5cm.) wide

£4,000-6,000

\$6,100-9,000

€5,700-8,400

From a now defunct locality, this large, well-balanced specimen of benitoite (state gemstone of California) and neptunite has excellent contrasts and colours.



***73**

A SPECIMEN OF MALACHITE

from the Mashamba West Mine, Katanga, the botryoidal crystals with natural surface lustre and texture, formed by fluids running through the deposit in the mine over millennia, which slowly and naturally polished the malachite; on custom, engraved lucite base
8in. (70cm.) high

£5,000-8,000

\$7,600-12,000
€7,100-11,000



***74**

CALCITE ON DOLOMITE

HUANGSHI, CHINA

golden brown scalenohedron crystals of calcite, with natural etchings, atop a matrix Dolomite, from the Tongloushan Excavation Site, Daye County
6in. (15cm.) wide

£800-1,200

\$1,300-1,800
€1,200-1,700



***75**

AESTHETIC SPECIMEN OF CRYSTALLINE GOLD

TUOLUMNE COUNTY, CALIFORNIA

the large specimen of gold crystals naturally formed across the quartz matrix,
from the "Mother Lode"

4½in. (11cm.) high

£15,000-25,000

\$23,000-38,000

€22,000-35,000



76

***76**
FINE CRYSTALLINE GOLD
NEVADA, USA

the crystals of multiple natural forms, including octahedral, hexahedral and some displaying spinel-law twinning, from Round Mountain Mine, Round Mountain District, Nye Co.
2in. (5cm.) long

£6,000-9,000

\$9,100-14,000
€8,500-13,000

***77**
FERBERITE AND FLUORITE
PORTUGAL

of natural form, the fluorite crystals see flowing down from the crown of this piece alongside the edges framing the ferberite, from Panasqueira Mine, Couto Mineiro da Panasqueira, Panasqueira, Covilhã, Castelo Branco District

5in. (13cm.) wide
£2,500-3,500

\$3,800-5,300
€3,600-4,900



77

*78

A STEGOSAURUS PLATE

WYOMING, USA

a 20½ inch plate of *Stegosaurus stenops* from the Morrison Formation, Bone Cabin Quarry, Albany county Wyoming, Jurassic (156-147 million years ago)

20½in. (52 cm.) high

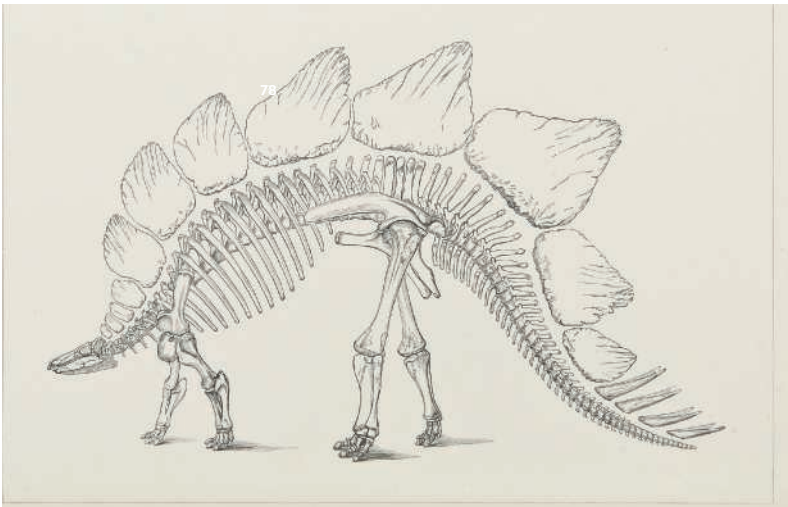
£3,000-5,000

\$4,600-7,500

€4,300-7,000

First discovered in the late nineteenth century by Othniel Charles Marsh, Stegosaurus are perhaps the most distinctive in appearance of all the dinosaurs with large plates along their backs and a fearsome tail spikes. The plates were originally thought to have been defensive armament for these enormous herbivores, but recently it has been suggested that they may have been for thermal regulations or sexual display.

The Bone Cabin Quarry is so-called because in 1897 W.G. Granger, a researcher for the American Museum of Natural History, came across a hut with its foundations made up from the local stone - pieces of dinosaur bone. Excavations in later years turned up some of the earliest and most important Jurassic specimens, such as the Carnegie *Diplodocus*, from which was made the famous cast "Dippy" who can be seen in the entrance hall of the Natural History Museum in London.



(Marsh's original illustration of *Stegosaurus*, not included in the lot)



79

***79**
A TRILOBITE
MOROCCO

a 2-inch *Leonaspis* sp. from the middle Devonian (393–383 million years ago) on original matrix with a brachiopod, prepared by Jeff Hammer
4in. (10cm.) wide

£1,200–1,800

\$1,900–2,700
€1,700–2,500

***80**
TRILOBITE
MOROCCO

the *Metacanthina issoumourensis* from the Pragian, Devonian (circa 411–408 million years ago) displaying well preserved schizochroal eye, prepared by Jeff Hammer
4in. (10cm.) wide

£1,200–1,800

\$1,900–2,700
€1,700–2,500



80



81

***81**

A TURRET-EYED TRILOBITE

RIVER VOLKHOV, RUSSIA

a *Chasmops nasutus* from the Ordovician
(485-444 million years ago)
4½in. (11cm.) wide

£1,000-1,500

***82**

A BURROWING TRILOBITE

MOROCCO

Paralejurus dormitzeri from the middle Devonian (393-
383 million years ago), prepared by Jeff Hammer
4in. (10cm.) wide

£1,000-1,500

\$1,600-2,300
€1,500-2,100

\$1,600-2,300
€1,500-2,100



82



83



84

***83**
A TRILOBITE
 MOROCCO

Crotalocephalina gibba from the Pragian, Devonian (circa 411-408 million years ago) with a partial shell in the matrix, prepared by Jeff Hammer
 3½in. (9cm.) wide

£1,000-1,500

\$1,600-2,300
 €1,500-2,100

***84**
A SPINY TRILOBITE

Kettneraspis sp. from the Devonian (419-359 million years ago), prepared by Jeff Hammer
 4¼in. (11cm.) wide

£1,000-1,500

\$1,600-2,300
 €1,500-2,100



85

A FOSSIL PALM FLOWER AND FISH

GREEN RIVER, WYOMING

the flower of a *Sablites* sp. in the same matrix as a *Priscara liops* from the Eocene
(circa 50 million years ago)

25 x 19in. (64 x 49cm.)

£5,000-8,000

\$7,600-12,000

€7,100-11,000



86

86
A SPECIMEN OF PETRIFIED WOOD
NORTHERN ARIZONA, USA

Araucarioxylon arizonicum from the late Triassic (circa 225 million years ago), the slice cut and polished to reveal internal structure with strong colours

19 x 15 x 8in. (48 x 38 x 20 cm.)

£2,000-3,000

\$3,100-4,500
€2,900-4,200

87
A FOSSIL WOOD BOWL
MADAGASCAR

Araucaria sp. from the late Triassic (235-201 million years ago) of bowl form, cut and polished 17½in. (44cm.) wide

£2,000-3,000

\$3,100-4,500
€2,900-4,200



87

88

A SLICE OF TIGER IRON
ORD RANGES, AUSTRALIA

from the Paleoproterozoic (2.5 to 1.6 billion years ago)
the banded layers of hematite, jasper and chatoyant
Tiger-eye

1 5/8 in. (39cm.) wide

£1,000-1,500

\$1,600-2,300
€1,500-2,100

As one of the earliest fossilized forms of life, a mystery still surrounds the creation of Tiger Iron almost 2 billion years ago — during a hostile era when the newly formed continents were barren and life was confined to the seas. Scientists have suggested that it is a banded iron formation (layered sediments caused by photosynthetic cyanobacteria) or a Stromatolite (layers of algae), or even both. Simple photosynthesising life forms such as these dominated the first two billion years of life on Earth, and were probably the source of the Oxygen in the atmosphere.



88

89

BANDED IRON TIGER EYE
AUSTRALIA

from the early Proterozoic (circa 2.5 billion years ago) the
panel of Marra Mamba iron formation cut and polished
1 1/2 in. (37cm.) wide

£1,000-1,500

\$1,600-2,300
€1,500-2,100

Found only in the blue crocidolite seams of the Hamersley Range in the Pilbara region of Western Australia, this highly iridescent ironstone, Marra Mamba, is amongst the rarest and most colourful of all Tiger-eye. Probably stromatolitic in origin, this fossil is amongst the earliest signs of life on Earth, and as a semi-precious stone is also one of the most beautiful.



89



***90**

A SPHERE OF BANDED IRON TIGER EYE

MT BROCKMAN STATION, AUSTRALIA

from the early Proterozoic (circa 2.5 billion years ago)
the panel of Marra Mamba iron formation cut and
polished to form a sphere
11½in. (29cm.) diameter

£7,000–10,000

\$11,000–15,000
€9,900–14,000

Found only in the blue crocidolite seams of the Hamersley Range in the Pilbara region of Western Australia, this highly iridescent ironstone, Marra Mamba, is amongst the rarest and most colourful of all Tiger-eye. Probably stromatolitic in origin, this fossil is amongst the earliest signs of life on Earth, and as a semi-precious stone is also one of the most beautiful.

91

AN AMETHYST GEODE

ARTIGAS, URUGUAY

of concave form, one side cut and polished to reveal the dark purple crystals of amethyst

£1,300-1,800

\$2,000-2,700
€1,900-2,500



91

92

A PYRITE NODULE

CHINA

the concretions of pyrite bands on shale
7in. (19cm.) wide

£1,000-1,500

\$1,600-2,300
€1,500-2,100



92

93

A SLICE OF ROSE QUARTZ

BRAZIL

the polished slice supported on stand
24in. (61cm.)

£1,200-1,800

\$1,900-2,700
€1,700-2,500



93



94

***94**

A PRIMITIVE FOSSIL PARROT

GREEN RIVER, WYOMING

Cyrilavis sp. from the Eocene (circa 50 million years ago)

with skull in facsimile and complete body

8½ x 7½in. (21.5 x 19.5cm.)

£4,000-6,000

\$6,100-9,000

€5,700-8,400

It is only in the last 30 years that the evolutionary history of parrots has been well studied, they had previously been thought to have the least complete fossil record amongst the birds. The present specimen is from an early stem group of parrots, before the development of their feeding specializations and distinctive curved beaks.



95

***95**

A FOSSIL JUVENILE TURTLE

GREEN RIVER, WYOMING

the *Chisternon undatum* from the Eocene (circa 50 million years ago)

6 x 6in. (15.5 x 15.5cm.)

£5,000-8,000

\$7,600-12,000

€7,100-11,000

A very rare juvenile example of an extinct species snapping turtle.



96

■ 96

TWO LARGE FRENCH AMMONITES
LORRAINE, FRANCE

Coroniceras sp. from the Toarcian, Jurassic
(183-174 million years ago)
32½ in. (83 cm.) high

£4,500-6,000

\$6,800-9,000
€6,400-8,400

97

A CLAW OF A LARGE SAUROPOD DINOSAUR
UTAH, USA

from a *Camarasaurus* sp. of the late Jurassic
(circa 155-145 million years ago)
12 in. (31 cm.) high on stand

£5,000-8,000

\$7,600-12,000
€7,100-11,000

Growing up to 75 foot in length, *Camarasaurus* was truly one of the giants of the Jurassic



97



98

***98**
A TYRANNOSAURID TOOTH
MONTANA, USA

Daspletosaurus torosus from Judith River Formation, Campanian, late Cretaceous, Toole County, (77-74 million years ago)
4in. (10cm.) high on stand

£1,000-1,500

\$1,600-2,300
€1,500-2,100



99

***99**
THE TOOTH OF A TYRANNOSAURUS-REX
MONTANA, USA

from the Hell Creek Formation, Maastrichtian, late Cretaceous (72-66 million years ago) the 5-inch tooth of a *Tyrannosaurus rex*, on stand
6in. (15cm.) high on stand

£1,500-2,500

\$2,300-3,800
€2,200-3,500

Slightly smaller than their well-known cousins *Tyrannosaurus rex* but living eight million years before them, *Daspletosaurus* was a ferocious dinosaur at the top of the food chain.



100

***100**

A LARGE ALLOSAUROUS CLAW

MOFFAT COUNTY, COLORADO

Allosaurus Fragilis, from the Morrison Formation, Skull Creek Quarry, late Jurassic (156-147 million years ago)
7 in. (18 cm.) long

£6,000-9,000

\$9,100-14,000

€8,500-13,000

***101**

THE TOOTH OF A TYRANNOSAURUS-REX

SOUTH DAKOTA, USA

the fully rooted tooth of *Tyrannosaurus rex*, from the Hell Creek Formation, Maastrichtian, late Cretaceous (72-66 million years ago)

8½ in. (21 cm.) long

£7,000-10,000

\$11,000-15,000

€9,900-14,000

The most famous and iconic of all dinosaur species, the T-rex was first described by Henry Fairfield Osborn in 1905 from a skeleton found in 1902 from the Hell Creek Formation in Montana. Standing over 13ft tall and 40ft long, the T-rex was the top predator of the late Cretaceous, and amongst the last dinosaurs to walk the earth before their mass extinction.



101

67



102

***102**

THE VERTEBRA OF A TRICERATOPS
HELL CREEK FORMATION, MONTANA

from the Hell Creek Formation, Maastrichtian, late Cretaceous (68-65 million years ago), a vertebra of a *Triceratops sp.*, on custom stand
18in. (46cm.) high

£1,000-1,500

\$1,600-2,300
€1,500-2,100

With its three-horned head, the triceratops is one of the most famous species of dinosaur. They lived at the very end of the Cretaceous Period before the fatal mass-extinction triggered by the asteroid that caused the Chicxulub crater 65 million years ago. These 30-foot long herbivores, weighing 12 tonnes, roamed in an area that is now to the East of the Rocky Mountains in North America, which then had a mild climate. They lived contemporaneously with, and were preyed upon by, *Tyrannosaurus rex*.



103

***103**

A FINE ROOTED ALLOSAURUS TOOTH
WYOMING, USA

Allosaurus sp. from the Morrison Formation, Dana Quarry, Ten Sleep, Washakie County, Kimmeridgian, late Jurassic (circa 155 million years ago)
2in. (5cm.)

£2,000-3,000

\$3,100-4,500
€2,900-4,200

■*104

AMOSOSAUR SKELETON
MOROCCO

Halisaurus arambourgi from Khouribga phosphate deposits, Maastrichtian, late Cretaceous (72–66 million years ago)
8ft. (2.4m) long

£25,000–35,000

\$38,000–53,000
€36,000–49,000





105

105
ROSE QUARTZ ON PYRITE
PERU

of natural form, on fitted stand
10½ in. (27cm.)

£800-1,200

\$1,300-1,800
€1,200-1,700

***106**
A SPECIMEN OF PETRIFIED WOOD
ARIZONA, USA

Araucarioxylon arizonicum polished to egg form, from the
Chinle formation, Triassic (circa 225 million years ago)
12.5 in. (32cm.) high

£1,000-1,500

\$1,600-2,300
€1,500-2,100



106



107

107
TWO AMETHYST GEODES
BRAZIL

of concave form, both cut and polished
11 in. (28.5cm.) high

£1,200-1,500

\$1,900-2,300
€1,700-2,100





***108**

A PTEROSAUR

SOLNHOFEN, GERMANY

from the Jurassic (circa 150 million years ago) the complete skeleton of *Rhamphorhynchus muensteri* placed in ammonite-bearing matrix

41 x 30in. (105 x 79cm.)

£90,000-120,000

\$140,000-180,000

€130,000-170,000

From the order Pterosauria “flying-lizards” that includes the pterodactyls, this large flying dinosaur with a 50-inch wingspan is one of the largest and rarest found in the Solnhofen formation. A light-weight body with hollow bones made it perfectly adapted to life in the air above the Jurassic coast. On very rare occasions they would have fallen into muddy lagoon below, to be preserved and turned to stone over the millions of years. The name *Rhamphorhynchus* means “beak-snouted” and with its fearsome set of teeth it would have preyed upon the fish of the Solnhofen fauna.

109

AN ENGLISH WOOLLY MAMMOTH TOOTH

WANDSWORTH, LONDON

the molar of a *Mammuthus primigenius* from the Devensian (110,000–10,000 years ago), with an old collection label applied to the side
9½in. (24cm.)

£1,000–1,500

\$1,600–2,300

€1,500–2,100

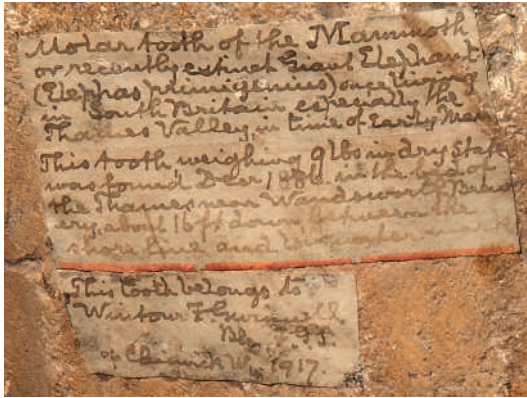
PROVENANCE:

Found December 1886

Collection of Wintour F. Gwinnell FGS, 1917



109



(detail of label)

110

A SLICE OF PETRIFIED WOOD

OREGON, USA

cut and polished, from the Eocene (50–34 million years ago)
23in. (59cm.) diameter

£1,800–2,500

\$2,800–3,800

€2,600–3,500



110



*111

A DINOSAUR VERTEBRA

SOUTH DAKOTA, USA

a small vertebra from the tail of *Edmontosaurus annectens* from the Ruth Mason Quarry, Hell Creek Formation, Ziebach County late Cretaceous (66 million years ago)

9in. (23cm.)

£1,000-1,500

\$1,600-2,300

€1,500-2,100



■*112

A LARGE MOSOSAUR SKULL

MOROCCO

Prognathodon curii from the Khouribga phosphate deposits, Maastrichtian, late Cretaceous (72-66 million years ago)

39in. (100cm.) long

£30,000-50,000

\$46,000-75,000

€43,000-70,000



113

■ 113
A FOSSIL TREE BRANCH
MADAGASCAR

Araucaria sp. polished
3 5/8 in. (89cm.) long

£800-1,200

\$1,300-1,800
€1,200-1,700

114
A SEA-BED PLAQUE
KHOURIBGA, MOROCCO

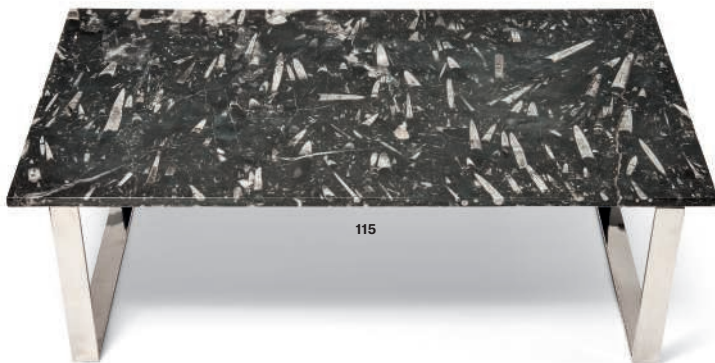
natural assemblage with remains of a
Mosasaur jaw, *Carcharodon*, and other
species, in their limestone matrix
2 5/8 in. (65cm.) wide

£700-1,000

\$1,100-1,500
€980-1,400



114



115

■ 115
A FOSSIL PANEL TABLE TOP
MOROCCO

the polished marble top from the
Devonian (414-345 million years
ago) with specimens of *Orthoceras* sp.,
on a glass and chrome low table
47 x 27 1/2 x 16 in. (120 x 70 x 41cm.)

£1,000-1,500

\$1,600-2,300
€1,500-2,100



116

116
AN AMMONITE
MADAGASCAR

Lytoceras sp. from the Jurassic (201-145 million years ago)
1 1/2 in. (28cm.) diameter

£1,000-1,500

\$1,600-2,300
€1,500-2,100

117
A FOSSIL FERN
OSNABRUECK, GERMANY

the *Neuropteris sp.* in its original shale matrix
13 in. (33cm.) high

£2,800-3,500

\$4,300-5,300
€4,000-4,900



117



118
TWO AMMONITES
MADAGASCAR

one of the *Cloniceras* sp. polished to reveal suture lines,
on stands

8¾in. (22cm.) wide

£800-1,200

\$1,300-1,800
€1,200-1,700

119
A WOOLLY MAMMOTH TOOTH
TAYMYR, RUSSIA

From the Devensian (110,000 to 10,000 years ago), the
tooth of a *Mammuthus primigenius*
12in. (31cm.) long

£1,000-1,500

\$1,600-2,300
€1,500-2,100





120

120
TWO TRILOBITES
MOROCCO

a *Drotops armatus* and *Drotops megalomanius* from the middle Devonian (393–388 million years ago), on stands
8in. (21cm.) wide on stand (2)

£1,000–1,500

\$1,600–2,300

€1,500–2,100

121
A MEGALODON TOOTH
NORTH CAROLINA, USA

From the Tortonian (12–7 million years ago) a 6-inch tooth of a *Carcharodon sp.*, on stand
6½in. (17cm.) high

£2,000–3,000

\$3,100–4,500

€2,900–4,200



121



122

122
AN AMMONITE
 RUSSIA

Speetonicerus sp. from Oxfordian, late Cretaceous
 (164-157 million years ago), supported on stand
 15 in. (38cm.) wide

£1,500-2,500

\$2,300-3,800
 €2,200-3,500

123
A LARGE SPLIT AMMONITE
 MADAGASCAR

Cleonicerus sp. from the early Cretaceous
 (circa 135 million years ago), split and polished to reveal
 inner chambers of caramel-brown calcite
 1 3/2 in. (34cm.) diameter

£2,000-3,000

\$3,100-4,500
 €2,900-4,200



123





(front)



(reverse)

***124**
AN IRIDESCENT AMMONITE
CANADA

the 17-inch specimen of *Placenticerus costatum* from the upper Cretaceous, Bearpaw formation (75-72 million years ago), showing strong iridescence of red, orange and green yellows to both sides.

17in. (45cm.) wide

£20,000-30,000

\$31,000-45,000
€29,000-42,000

The opal like iridescence of these ammonites from Alberta, Canada has been termed ammolite and since 1981 has had the status of a gemstone. The shimmering, metallic colours were caused by the combination of millions of years of compression and the mineralization of iron, copper and silica which precipitated from volcanic ash. The opalescent layers of colour are particularly prized in the Chinese philosophical system of Feng-Shui.

The ammonites are a group of molluscs that lived in the seas from the mid-Devonian (approximately 400 million years ago) to the end of the Cretaceous (65 Million years ago). The sequence of events that famously killed off the dinosaurs also drove the ammonites to extinction



125

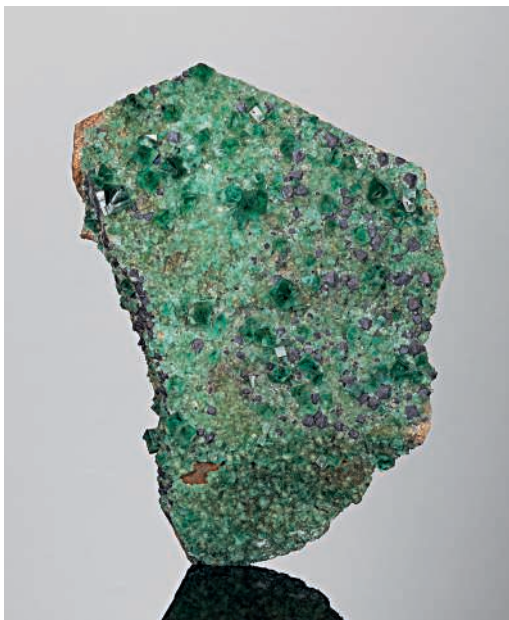
***125**

A STALACTITE OF MALACHITE

of natural form, from Congo Mine, Lubumbashi,
Katanga Copper Crescent, Katanga Province
6in. (15cm.) high

£1,200-1,800

\$1,900-2,700
€1,700-2,500



126

***126**

A LARGE PLATE OF ENGLISH FLUORITE
COUNTY DURHAM

of natural form, the green crystals showing fluorescence
to deep purple in sunlight from the Rogerley Mine,
Weardale

16in. (41cm.) wide

£5,000-8,000

\$7,600-12,000
€7,100-11,000



127

***127**

A LARGE SPECIMEN OF STILBITE

INDIA

from Puna, Maharashtra, the cream-coloured stilbite in natural "bowtie" crystal form with excellent luster and habit, on matrix

5½in. (14cm.) wide

£600-900

\$910-1,400
€840-1,300



128

***128**

YELLOW FLUORITE

SPAIN

from Villabona Mine, Asturias, the tower of yellow crystals with an intense hue and luster

6¼in. (16cm.) high

£2,500-3,500

\$3,800-5,300
€3,600-4,900



***129**
A SPECIMEN OF FLUORITE
 TENNESSEE, USA

from Elmwood Mine, Carthage, Central Tennessee
 Ba-F-Pb-Zn District, Smith Co., the attractive cluster of
 sharp cubic fluorites, with purple colour and lustre
 8in. (20cm.) wide

£2,000-3,000

\$3,100-4,500
 €2,900-4,200

The old Elmwood Zinc mine is one of the most famous in the world for classic old American material, of fluorite and sphalerite, calcite, and barite. This specimen was collected in the 1980s and remains in fine condition.

***130**
MALACHITE PSEUDOMORPH AFTER AZURITE
 NAMIBIA

from the Tsumeb Mine, Tsumeb, Otjikoto, swirling chatoyant patterns of the malachite with velvet-like appearance while preserving the sharp crystal faces of the Azurite; the reverse side showing the lustre of deep blue azurite and areas that are pseudomorphed
 4in. (10.5cm.) high

£1,200-1,800

\$1,900-2,700
 €1,700-2,500

This is a classic example of a Pseudomorph of Azurite into Malachite from one of the most productive copper mines in history.



***131**
GALENA AND QUARTZ
 BULGARIA

from Madan ore field, Rhodope Mts, Smolyan Oblast, the galena of classic spinel-law twinning form, with dozens of terminated quartz crystals, all of natural form
 6in. (15cm.) wide

£600-900

\$910-1,400
 €840-1,300



131

***132**

PINK SMITHSONITE

MEXICO

from Choix, Sinaloa Province, of
natural form

3¾in. (9.5cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500

These old smithsonites from a small artisanal (hand tool worked) mine in Choix, once worked for lead, have produced some of the world's most beautiful specimens of smithsonite, a lead carbonate mineral species. Collectors today still treasure these old classics, though they only turn up on the market out of old collections. The present specimen has a particularly nice display face with rolling hillocks of natural pastel colour, and no damage at all. It would date before 2000, when the last finds came out. Smithsonite of this particular colour and shape combination is unique to this location.



•*133

CUBES OF PYRITE

SPAIN

the cubic crystals of natural form, in
their rhyolite matrix

14in. (36cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500





134

***134**
NATIVE WIRE SILVER IN CALCITE
MOROCCO

the crystallized wire silver cover a white calcite face on black acanthite matrix, from the Imiter Mine, Boumalne-Dadès, Ouarzazate Province, Souss-Massa-Draâ Region
5½in. (14cm.) high

£800-1,200

\$1,300-1,800
€1,200-1,700



135

***135**
SPECIMEN OF PYRITE ON QUARTZ
WASHINGTON, USA

from Spruce Claim, Goldmyer Hot Springs, King Co., the cluster of terminated quartz crystals lustrous pyrite cubes
7in. (17cm.) wide

£4,000-6,000

\$6,100-9,000
€5,700-8,400

136

SIKHOTE-ALIN METEORITE

FELL TO EARTH IN SIBERIA, RUSSIA IN 1947

This specimen (a coarse octahedrite, IIAB) is a complete individual showing delicately structured, centimetre-size, regmaglypts (thumb print like appearances) produced during the meteorite's fiery plunge through the atmosphere.

7in. (18cm.) high

£5,000-8,000

\$7,600-12,000

€7,100-11,000

Sikhote-Alin is responsible for one of the largest meteorite showers in recorded history. After breaking off from its parent body 320 million years ago, the 70-metric-ton iron mass wandered through interplanetary space until it encountered the Earth. On 12 February 1947 a fireball, brighter than the Sun, exploded at an altitude of about 6 km over Eastern Siberia. Sonic booms were heard at distances up to 300 km from the impact point. On the ground, chimneys collapsed, windows shattered and trees were uprooted. A 33-km-long smoke trail persisted for several hours in the atmosphere after the meteorite struck the ground. Iron fragments were scattered over an elliptical area of 1.6 square kilometres. Many of the fragments penetrated the soil, producing impact holes as large as 26 meters; about 200 such holes have been catalogued. Polished and etched slabs of Sikhote-Alin reveal a very coarse "Widmanstätten" pattern, a product of very slow cooling in the metal core of a differentiated asteroid. A famous painting of the event by artist and eye-witness P. I. Medvedev was reproduced as a postage stamp issued by the Soviet government in 1957 to commemorate the tenth anniversary of the meteorite fall.





137

137

A CAMPO DE CIELO METEORITE

GRAN CHACO GUALAMBA, ARGENTINA

a complete iron meteorite, coarse octahedrite – IAB-MG
4½in. (12cm.) long

£1,000-1,500

\$1,600-2,300
€1,500-2,100



138

138

CAMPO DEL CIELO METEORITE

GRAN CHACO GUALAMBE, ARGENTINA

a complete iron meteorite, coarse octahedrite – IAB-MG
7½in. (19cm.) long

£1,500-2,500

\$2,300-3,800
€2,200-3,500



139

139

A CAMPO DEL CIELO METEORITE

GRAN CHACO GUALAMBE, ARGENTINA

a complete iron meteorite, coarse octahedrite – IAB-MG; the surface with deep natural grooves and crenellations that are accented by a dusky platinum-hued patina
7in. (18cm.) wide

£2,500-3,500

\$3,800-5,300
€3,600-4,900

This great meteorite was first discovered by Spanish explorers in Chaco, Argentina in 1572. Thousands of pieces have been found near the point of impact, the largest weighing an immense 37 tons. It has been determined from carbon dating, taken from charred wood remains from the crater, that the fall occurred between 4,000 and 6,000 years ago. The cosmic radiation of the Meteorite mass was found to be relatively young at approximately 14 Million years old.



***140**

END PIECE OF A LUNAR BRECCIA (NWA 8277)

DISCOVERED IN MOROCCO, 2013

the cut face of this dark-coloured specimen contains impact melt, the matrix of with white feldspar and green-brown pyroxene and olivine grains; the reverse side with a sandblasted patina

3in. (8cm.) wide

£30,000-50,000

\$46,000-75,000

€43,000-70,000

There are currently less than 250 lunar meteorites known, but because many specimens break up in the atmosphere or on the ground, there are probably only about 120 separate lunar meteorites. None is an observed fall. Lunar meteorites are readily recognizable because they can be compared to the samples returned by the Apollo astronauts and three Soviet Luna missions. Many of the lunar meteorites were shocked when launched from the Moon's surface. NWA 8277 is a breccia composed of numerous inclusions containing various-size crystals of plagioclase (a calcium-aluminum silicate), pyroxene and olivine (magnesium- and iron-rich silicate minerals). The specimen was found in the Sahara as a single 773-g stone without any fusion crust.



***141
TIRHERT METEORITE — A METEORITE WHICH NEVER
HIT EARTH**

HED - UNBRECCIATED EUCRITE

GUELMIM-ES-SEMARA, MOROCCO (28°93' N, 8°90' W)

Blanketed in what is possibly the glossiest fusion crust of *any* meteorite — a characteristic that the accompanying image cannot truly capture — is the richly evident rippling of formerly molten material.

61 x 44 x 49mm (2½ x 1¾ x 2 in.)

148g

£12,000–18,000

\$19,000–27,000

€17,000–25,000

On July 9, 2014 at 9:30pm Southern Morocco experienced an intense fireball travelling south-easterly followed by multiple sonic booms heard as far as 220 km from the impact site. Municipal and governmental authorities immediately mounted a search, and the next day meteorites were recovered close to the stretch of Highway 12 that runs between Fom El Hisn and Assa

near the Algerian border. The news of meteorites being found travelled quickly and in short order hundreds of people arrived at the 3 x 6 kilometre site. Tihert meteorites have what is perhaps the glossiest and most lustrous fusion crust of any meteorite. Gleaming even in soft light, Tihert specimens possess an almost inconceivable glaze. Transparent patches of fusion crust reveal plagioclase grains beneath the surface; samples that broke on impact further reveal honey-brown pyroxene grains. While the Tihert meteorite shower occurred in an area nearly bereft of vegetation, a young boy found the specimen now offered wedged between the branches of a small tree — and he enjoyed quite a bit of local celebrity as a result. There are only about 20 unbrecciated eucrites known; about a dozen were found in Antarctica and are forever unavailable to the public. Tihert is the only witnessed fall of an unbrecciated eucrite.



*142

SYLACAUGA METEORITE

H4

TALLADEGA COUNTY, ALABAMA (33°14' N, 86°17' W)

This fresh partial slice has two edges of fusion crust delimiting its grey matrix with a rich profusion of iron-nickel flakes suspended throughout. Modern cutting.

39 x 32 x 2 mm ($\frac{1}{2}$ x $\frac{1}{4}$ x $\frac{1}{8}$ in.)

10.3g

£5,000–8,000

\$7,600–12,000

€7,100–11,000

PROVENANCE:

Smithsonian Institution, Washington, D.C.

Dr. James Schwade Meteorite Collection, Kankakee, IL

The only documented instance of a meteorite injuring a person occurred on November 30, 1954 at 2:46 pm in Sylacauga, Alabama. The fireball from which the meteorite originated was seen in broad daylight across three states and its descent was accompanied by sonic booms. Some eyewitnesses thought a plane had crashed; others felt this extraordinary event was the nefarious

doings of the Soviets — the result of rampant Cold War paranoia. Two meteorites were recovered. One crashed through the roof of Ann and Eugene Hodge's home, where it bounced off a radio and struck Ann Hodges while she napped. While Hodges and her landlord fought over the meteorite's ownership, the U.S. Air Force took custody. While the law favored the landlord, public sentiment was solidly behind Hodges, who exclaimed, "God intended it to hit me. After all, it *hit me!*" The second meteorite was found by a local farmer, Julius McKinney, who quickly sold his specimen to the Smithsonian. The proceeds from this sale enabled McKinney to purchase a new car and home. The Hodges finally owned the meteorite that punctured their roof (and almost Ann herself) after a year of legal wrangling and a payout to their landlord. However, interest had waned during the course of the year and when the Hodges couldn't find a buyer, they donated the rock to the Alabama Museum of Natural History. Never having recovered from the emotional distress associated with these events, Ann Hodges suffered a nervous breakdown and died at the age of 52.



■ 143

LARGE SIKHOTE-ALIN METEORITE

IRON, COARSE OCTAHEDRITE - IIAB

MARITIME TERRITORY, SIBERIA, RUSSIA (46°9' N, 134°39' E)

Blanketed in a dark gun-metal patina and engagingly sculptural, this impressive meteorite is supported on a fitted stand.

33 x 23 x 22cm. (13 x 9 x 9in.)

45kg (99lbs)

£20,000-30,000

\$31,000-45,000

€29,000-42,000

The Sikhote-Alin event was the largest meteorite shower in recorded history. After breaking off from its parent asteroid 320 million years ago, a 70-metric-ton iron mass wandered through interplanetary space until encountering Earth on 12 February 1947. A fireball

brighter than the Sun (it created moving shadows in broad daylight) was seen to explode at an altitude of about 6 km over eastern Siberia. Sonic booms were heard at distances up to 300 km from the point of impact. Chimneys collapsed, windows shattered and trees were uprooted. A 33-km-long smoke trail persisted for several hours in the atmosphere after impact. Iron fragments were scattered over a broad elliptical area. Many of the fragments penetrated the soil, producing impact craters as large as 26 meters; about 200 such depressions have been catalogued. A famous painting of the event by artist and eye-witness P. I. Medvedev was reproduced as a postage stamp issued by the Soviet government in 1957 to commemorate the tenth anniversary of the meteorite fall.



144

***144**

AN ALLOSAURUS LEG BONE

WYOMING, USA

the tibia of an *Allosaurus fragilis*, from the Morrison Formation, Bone Cabin Quarry, Albany county, Jurassic (156-147 million years ago), with support stand for vertical display

29in. (74cm.) long

£2,000-3,000

\$3,100-4,500

€2,900-4,200

***145**

A JURASSIC DINOSAUR VERTEBRA

WYOMING, USA

a tail vertebra of *Diplodocus carnegii* from the Dana Quarry, Ten Sleep, Washakie County, Kimmeridgian, late Jurassic (circa 155 million years ago)

10 x 16 x 8½in. (25 x 41 x 22cm.)

£1,000-1,500

\$1,600-2,300

€1,500-2,100



145



146

■ **146**
A FOSSIL SAWFISH
 LEBANON

from the late Cretaceous, (101–66 million years ago), the 50 inch *Sclerorhynchus sp.* in matrix, fitted for wall mounting
 56 x 19in. (142 x 48cm.)

£2,000–3,000

\$3,100–4,500
 €2,900–4,200

147
A FOSSIL SHRIMP
 SOLNHOFEN, GERMANY

from the Jurassic (circa 150 million years ago) the 10-inch specimen of *Aeger tipularius*, very well preserved, in original matrix
 29½ x 2 1in. (75 x 53cm.)

£1,500–2,500

\$2,300–3,800
 €2,200–3,500



147



148

148
A FOSSIL LOBSTER
SOLNHOFEN, GERMANY

a 7-inch *Cycleryon propinquus* from the Jurassic (150 million years ago)

12 x 10½in. (30 x 27cm.)

£1,500–2,500

\$2,300–3,800
€2,200–3,500

149
A FOSSIL SHRIMP
SOLNHOFEN GERMANY

Aeger sp. from the Jurassic (circa 150 million years ago)
8 x 12in. (20 x 30cm.)

£1,200–1,800

\$1,900–2,700
€1,700–2,500



149



150

150

A LARGE TRICERATOPS HORN
HELL CREEK FORMATION, MONTANA

from the Maastrichtian, late Cretaceous (68–65 million years ago), a brow horn from a *Triceratops sp.*, on custom stand

21 in. (53 cm.) long

£2,500–3,500

\$3,800–5,300

€3,600–4,900

With its three-horned head, the triceratops is one of the most famous species of dinosaur. They lived at the very end of the Cretaceous Period before the fatal mass-extinction triggered by the asteroid that caused the Chicxulub crater 65 million years ago. These 30-foot long herbivores, weighing 12 tonnes, roamed in an area that is now to the East of the Rocky Mountains in North America, which then had a mild climate. They lived contemporaneously with, and were preyed upon by, *Tyrannosaurus rex*.

151

A LARGE FOSSIL FISH
GERMANY

Dapedium sp. from the Lower Jurassic, Toarcian (182–174 million years ago) Posidonienschiefer formation, Holzmaden Germany
10 x 19 in. (26 x 49 cm.)

£2,500–3,500

\$3,800–5,300

€3,600–4,900



151



152

■ 152
A DINOSAUR FOOTPRINT
UTAH

probably from a Hadrosaur from the late Cretaceous
(100–66 million years ago)
28in. (71cm.) high

£2,000–3,000

\$3,100–4,500
€2,900–4,200

Trace fossils represent the activity of past life, and along with body fossils are important evidence of past behaviour. The size of and spacing between footprints can provide information on fast a dinosaur was able to run.

153
AN AMMONITE GROUP
MADAGASCAR

various species including *Cleoniceras sp.* and *Cenoceras sp.*
three of the specimens polished, and all in their original
matrix

19in. (49cm.) high

£1,500–2,500

\$2,300–3,800
€2,200–3,500



153



154

154
A DINOSAUR EGG
FRANCE

from the Cretaceous
(145–66 million years ago)
10in. (26cm.) wide

£1,500–2,500

\$2,300–3,800
€2,200–3,500

■*155

A LARGE FOSSIL FISH
GREEN RIVER, WYOMING

the 23-inch *Phareodus encaustus* with
a *Priscacara serrata*, from the Eocene
(circa 50 million years ago)
44 x 35½in. (112 x 90cm.) (2)

£2,500–3,500

\$3,800–5,300
€3,600–4,900



155



■*156

A PLAQUE OF ELEVEN FISH
GREEN RIVER, WYOMING

from the Eocene (circa 50 million years ago), the large panel with various
species, including an 18-inch *Diplomystus dentatus*

56 x 42in. (142 x 107cm.) in frame

£3,000-5,000

\$4,600-7,500
€4,300-7,000



157

A JUVENILE ICHTHYOSAUR

GERMANY

from the lower Jurassic (200–176 million years ago) Posidonienschiefer formation, the *Stenopterygius quadriscissus* showing some three-dimensionality of preservation

14 x 49in. (36 x 125cm.)

£35,000–50,000

\$53,000–75,000

€50,000–70,000

The first complete Ichthyosaur skeleton was found by Mary Anning at Lyme Regis in 1811 (an *Ichthyosaurus communis*). The order Ichthyosauria was introduced in 1840 by Sir Richard Owen, and today about 80 species are recognised. They take their name from the Greek for “fish lizards” and are an excellent example of convergent evolution. It is thought that they evolved from land based lizards moving into the sea, eventually converging on the shape of the fish upon which they preyed.



158

A JURASSIC AQUATIC LIZARD
SOLNHOFEN, GERMANY

from the Tithonian age, Jurassic (circa 150 million years ago) the 5-foot long *Pleurosaurus goldfussi* with central torso left in original position, the neck and tail curled, in limestone slab supported on black backboard
45 x 23in. (114 x 60cm.)

£30,000-50,000

\$46,000-75,000
€43,000-70,000

Pleurosaurus lived in the warm waters of an archipelago, or lagoon, on the edge an ancient ocean called the Thethys sea during the age of the Dinosaurs. Belonging to the order of lizard-like Rhynchocephalia (beaked-headed), their only surviving relatives are the tuataras of New Zealand. The present specimen is very finely preserved.



■ 159

A VERY LARGE FOSSIL CROCODILE

GERMANY

Steenosaurus bollensis from the Lower Jurassic, Toarcian (182-174 million years ago) Posidonienschiefer Formation Holzmaden, the complete specimen with three-dimensional preservation, placed in heavy shale plaque for wall mounting

55½ x 119in. (141 x 302cm.)

£50,000-80,000

\$76,000-120,000

€71,000-110,000



Despite being not-too-distant relatives of the dinosaurs, the crocodylians survived the great extinction at the end of the Cretaceous (66 million year ago). *Stegosaurs* were a successful genus in the Jurassic, with at least twelve species found in sites across Europe and Morocco since 1825. A long snout with sharp teeth would suggest a diet predominantly of small fish. The preservation of armoured scutes to the body hint of a more combative lifestyle in the coastal waters of the Tethys Ocean 180 million years ago.

■ 160

A TRIPLE FOSSIL SEALILY PLAQUE

GERMANY

from the Lower Jurassic, Toarcian (174–182 million years ago)

Posidonienschiefer Formation, Holzmaden Germany, the three curved specimens of *Seirocrinus subangularis* anchored to a shell encrusted flotsam 50 x 39in. (196 x 97cm.)

£20,000–30,000

\$31,000–45,000

€29,000–42,000

Crinoids, also known as sealilies or feather stars, are examples of living fossils. They belong to the phylum Echinodermata, and are distantly related to the starfish, brittle star and sea urchin. Filter feeders, with crowns of pinnules that trap microscopic particles on which to feed, they sway back and forth on the ocean floor. Their fossil remains are found all over the world, but most beautiful and best preserved examples are those from the Posidonia shale beds of Holzmaden in southern Germany. The strong dark colour of the shale matrix serves as a beautiful background to the delicate serpentine neck of the fossil, highlighted by the subtle shimmer of pyritisation. The matrix itself has been prepared, to better the contrast with the superb three-dimensional detail of the fossil itself which stands out in high relief. This specimen remains attached to a piece of driftwood (not all species anchored themselves to the ocean floor, but floated through the oceans attached to drifting floral debris) and gathered around its holdfast are the remains of other members of the colony.





161

***161**

FOSSIL STINGRAY WITH SMALL FISH

GREEN RIVER, WYOMING

from the Eocene (circa 50 million years ago), a female *Heliobatis radians* showing fine preservation, with multiple small fish in a limestone matrix.

30 x 40in. (76 x 102cm.)

£2,500-3,500

\$3,800-5,300
€3,600-4,900

162

**A LARGE UNCOILED
HETEROMORPH AMMONITE**
VOLGA RIVER, RUSSIA

the iridescent *Tropaeum sp.* from the early Cretaceous (145-100 million years ago)

29in. (74cm.) high

£4,000-6,000

\$6,100-9,000
€5,700-8,400



162



***163**

A LARGE PREDATORY FISH SKULL

KANSAS, USA

the skull and front skeletal remains of, *Xiphactinus audax*, from the Niobrara Formation, Logan Co., Western Kansas, late Cretaceous (87-82 million years ago)

27 x 31 in. (69 x 78.5cm.)

£2,000-3,000

\$3,100-4,500
€2,900-4,200



164

■ 164
A VERY LARGE CARVED AMMONITE
MOROCCO

from the Cretaceous (145-66 million years ago) a
Mantelliceras sp. the front heavily carved, the reverse left in
natural state.

22in. (56cm.) wide

£2,500-3,500

\$3,800-5,300
€3,600-4,900

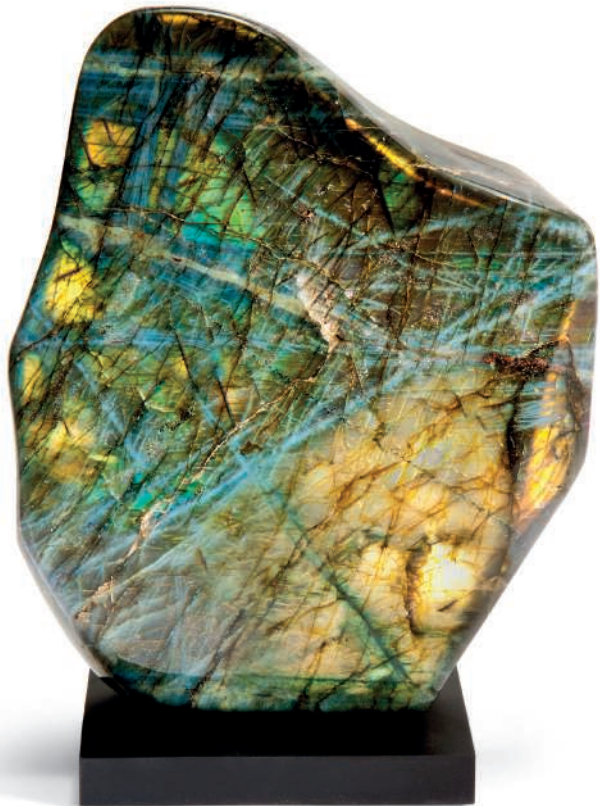
165
AN AMMONITE
RUSSIA

Speetonicerias sp. from the Oxfordian, late
Cretaceous (164-157 million years ago),
supported on iron stand
23in. (59cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500





166

166
A SPECIMEN OF LABRADORITE
MADAGASCAR

the free-form polished on all sides,
on custom base
12 in. (30cm.) high

£1,000-1,500

\$1,600-2,300

€1,500-2,100

■ **167**
A CHRYSOCOLLA SPECIMEN
MOROCCO

of natural form
29½ in. (75cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500



167



168

168
A SPLIT AMMONITE
 VOLGA RIVER, RUSSIA

Speetoniceras sp. from the Jurassic (200–145 million years ago) split and polished to reveal internal chambers, supported on custom stands
 18in. (46cm.) wide

£3,000–5,000

\$4,600–7,500
 €4,300–7,000

■ **169**
A SPECIMEN OF AMETHYST
 MINAS GERAIS, BRAZIL

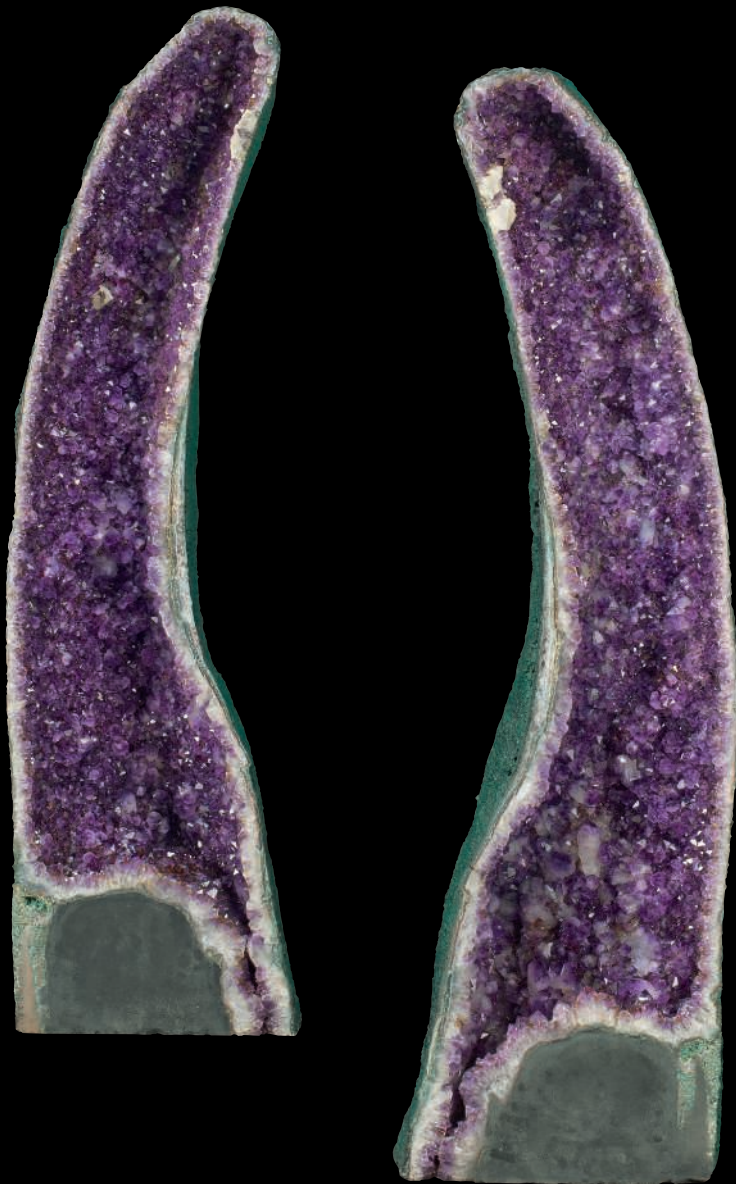
of hollow concave form, the edges polished
 2.5in. (6.3cm.) wide

£2,000–3,000

\$3,100–4,500
 €2,900–4,200



169



■ 170

A SPLIT AMETHYST GEODE PAIR

RIO GRANDE DO SUL, BRAZIL

of tall hollow concave form, each cut and polished
57in. (146cm.) tall

£5,000–8,000

(2)

\$7,600–12,000
€7,100–11,000



171
A SLICE OF PETRIFIED PALM WOOD
 INDONESIA

From the Oligocene (34–23 million years ago) the polished slice of *Palmoxylon sp.* preserving texture of bark to edge
 18in. (46cm.) wide

£1,500–2,500 \$2,300–3,800
 €2,200–3,500

***172**
FOSSIL LEAVES
 MONTANA, USA

specimens of *Beringiaphyllum cupanoides*, *Davidia antiqua*, *Viburnum asperum* and *Zizyphoides flabellum* from the Fort Union Formation, Paleocene (circa 64 million years ago) in their original matrix
 8½in. (21.5cm.) wide (2)

£1,000–1,500 \$1,600–2,300
 €1,500–2,100



172



173

***173**
A FOSSIL LEAF PLAQUE
 MONTANA, USA

multiple specimens of *Davidia antiqua* and *Viburnum asperum* from the Fort Union Formation, Paleocene (circa 64 million years ago) in their original matrix

15in. (37.5cm.) wide

£1,000–1,500 \$1,600–2,300
 €1,500–2,100

These leaves come from the geological age that immediately followed the extinction event that famously killed off the dinosaurs.

EDMONTOSAURUS (LOT 174)









■*174

A DUCK-BILLED DINOSAUR
SOUTH DAKOTA, USA

Edmontosaurus annectens, a highly complete specimen assembled from finds in a large bonebed from the Ruth Mason Quarry, Hell Creek Formation, Maastrichtian, Late Cretaceous (66 million years ago)
27ft. (8.3m) long

£200,000–300,000

\$310,000–450,000

€290,000–420,000

PROVENANCE:

Discovered at the Ruth Mason Quarry by the Black Hills Institute of Geological Research.

Seibu Museum of Art, Tokyo 1991–2005.

Whence acquired by a Private Collection, USA.

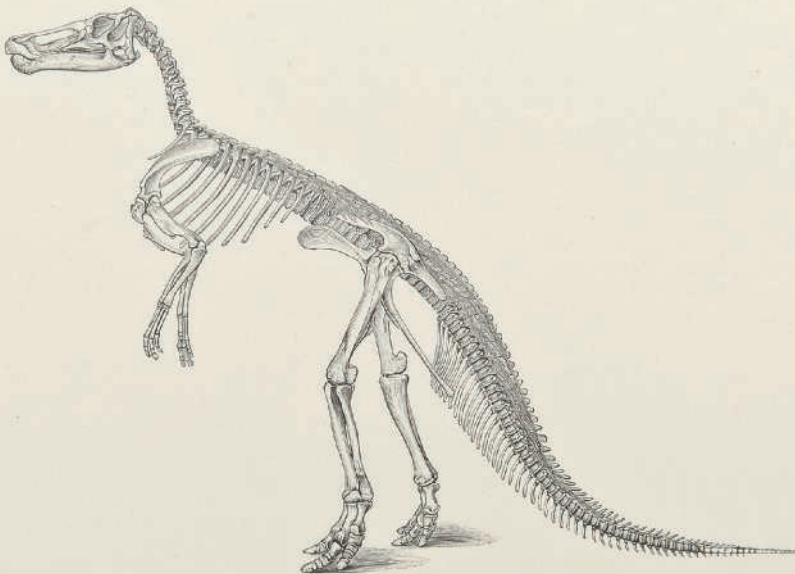
Bonham's, Reno, 3 October 2009, lot 25.

Private Collection, USA.

Acquired from the above by the present owners; the skeleton remounted to current pose.

EXHIBITED:

Museum of Ancient Life, Lehi, Utah, March 2015



RESTORATION OF CLAOSAURUS ANNECTENS Marsh.

(Marsh's original illustration, showing a bipedal stance, not included in the lot)

The most famous of the duck-billed dinosaurs, *Edmontosaurus* had short forelimbs, a long, pointed tail, feet fitted with three toes. The head was flat and ended with a beak. A herbivore, it chewed food with nearly a thousand small teeth in its cheeks. Its size could reach 13 metres and weigh 3.5 tons.

The early specimens discovered in the 1890s were named *Claosaurus* by Othniel Charles Marsh, who illustrated them as being fully bipedal. Later research has suggested it could also walk on all four legs to graze low lying vegetation. The stomach contents of the top carnivores of the time, and bite marks found on tail bones strongly suggest that *Edmontosaurs* were firmly on the menu for late Cretaceous theropod dinosaurs.

Living alongside fellow giants *Triceratops* and *Tyrannosaurus rex*, it was one of the last dinosaurs to walk the earth before their mass extinction 65 million years ago.

BOOKS (LOTS 175-180)



175

Δ175

WILLIAM HOOKER (1779-1832)

Pomona Londinensis. London: James Moyes for the author: 1818.
4° (335 x 270mm). 40 (of 49) aquatints printed in colour and finished by hand. (Occasional light marginal dust-soiling.) Together with loose and defective accompanying text within original printed paper wrappers (wrappers lightly spotted, a few margins dust-soiled). Nissen *BBI* 913. Sold as a collection of plates, not subject to return.

£2,000-3,000

\$3,100-4,500
€2,900-4,200

Φ176

JOHANN CHRISTOPH VOLCKAMER (1644-1720)

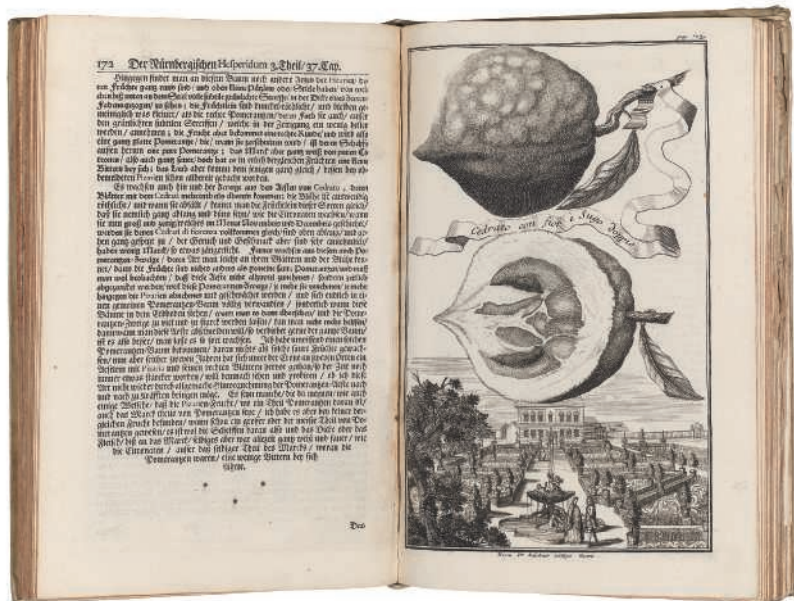
Nürnbergische Hesperides oder Gründliche Beschreibung der Edlen Citronat-, Citronen- und Pomeranzen-Früchte. Nuremberg: J.A. Endter, 1708.

First edition of one of the most celebrated 18th-century fruit books.

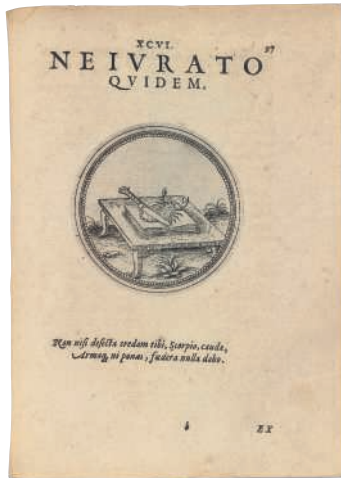
2° (360 x 230mm). 116 engraved plates, including frontispiece. (Early small marginal repair in H4, and short repaired tear to two folding plates; some leaves loose, these with light wear in the margins.) Contemporary vellum. *Provenance*: Freiherr Ernst von Grunelius and Freifrau Anna von Grunelius née Gräfin von Bernstorff (bookplate dated 1929) – Central Art Library, Dresden (small stamps and shelf mark).

£4,000-6,000

\$6,100-9,000
€5,700-8,400



176



177

JOACHIM CAMERARIUS (1534-1598)

Symbolorum & emblematum. Nuremberg: Vögelin, 1605.

King Friedrich August II's copy of the first collected edition of the first work to treat natural history in emblematic form.

4 parts in one volume, 4° (195 x 147mm). Four engraved titles, 400 circular emblems in the text. Emblem 77 in part I with light hand-colouring; emblems 8 and 10 in part IV tipped in. (Lower margin of first title repaired, preliminary leaves of part I bound with part IV.) Contemporary vellum, spine titled in manuscript, sides ruled in blind (lacking front free endpaper, vellum soiled). *Provenance:* J.Fr.L. Reupsch of Helmstadt (1727-1788; monogram on title, signature on first leaf) – Dr J.M.W. Baumann (entomological engraved bookplate; some underlining, perhaps in his hand) – Friedrich August II, King of Saxony (1797-1854; bookplate) – Dresden Central Art Library (deaccessioned stamp).

£900-1,200

\$1,400-1,800
€1,300-1,700

177



178

178

TOBIAS BEÜTEL (c.1627-1680)

Arboretum mathematicum. Dresden: Melchior Bergen, 1669.

First edition in a contemporary armorial binding.

4° (187 x 150mm). Engraved title, woodcut diagrams throughout. (Occasional small marginal dampstaining.)

Contemporary calf, spine gilt in compartments, sides richly panelled in gilt with an all-over design of nested borders, centred with indistinct arms in gilt, edges gilt (front joint starting to split but holding). *Provenance:* Friedrich Augustus, Prince of Brunswick-Oels (1740-1805; bookplate with shelf marks) — Dresden Central Art Library (small stamp).

£900-1,200

\$1,400-1,800
€1,300-1,700

For further information on these lots, please visit www.christies.com



178



179



179

6179

CLAUDIUS PTOLEMAEUS (C.100-C.170)

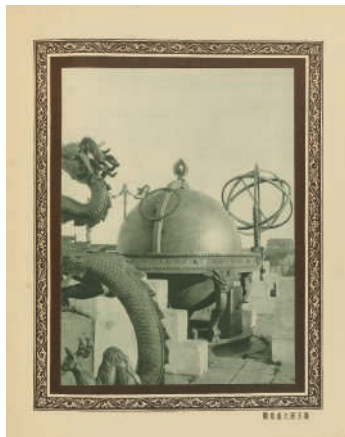
Geografia cioè *Descrizione universale della terra*. Venice: G. Battista and G. Galignani, 1598-1597.

First edition in Italian of Magini's Ptolemy, with 64 finely engraved maps.

2 parts in one volume, 2° (285 x 198mm). Engraved double-hemisphere world map and 63 engraved half-page maps. (e1 with marginal flaw touching text, K4v with neat marginal repair touching text.) Contemporary calf, gilt spine, speckled edges (rebacked preserving original spine, new pastedowns, lower cover with patches repaired, corners repaired, joints starting to crack). *Provenance*: Johann, King of Saxony (1801-1873; crowned monogram stamp on titles) — Saxon State and University Library, Dresden (cancelled stamp on verso of first title).

£2,000-3,000

\$3,100-4,500
€2,900-4,200



180

6180

HERBERT C. WHITE (FL. 1927).

Peking the Beautiful. Shanghai: The Commercial Press, Limited, 1927.

First edition with introduction by Hu Shih, rare with original box.

4° (395 x 315 mm). Half-title. Frontispiece and 70 photographic plates mounted, numerous illustrations in text. (title with light marginal finger-softening, some insignificant offsetting onto text leaves.) Original embroidered silk padded pictorial boards, edges uncut (extremities rubbed, lower joint splitting), contained in the original decorative box (worn, with crude tape repairs, one side missing).

£1,000-1,500

\$1,600-2,300
€1,500-2,100

For further information on these lots, please visit www.christies.com

GLOBES AND PLANETARIA (LOTS 181-193)





181

***181**
AN AMERICAN 6-INCH CELESTIAL GLOBE
 MERRIAM & MOORE 1852

comprised of twelve hand-coloured engraved gores, held in graduated brass meridian, supported on cart iron tripod stand with engraved calendrical sales on wooden horizon, the cartouche to southern hemisphere *A New Six Inch CELESTIAL Globe Reduced from the latest authorities of the Astronomical ASSOCIATION LONDON BY MERRIAM & MOORE STATIONERS TROY NY 1852.*

9in. (23cm.) high

£800-1,200

\$1,300-1,800
 €1,200-1,700

PROVENANCE:

from the collection of the astronomer Vera Rubin



182

PROPERTY OF AN IMPORTANT PRIVATE COLLECTOR

-182
A FRENCH ARMILLARY SPHERE
 EARLY 19TH CENTURY

With paper leaf covered wood spheres and a bone model of the earth and moon on an ebonised plinth
 15½in. (39cm.)

£2,000-3,000

\$3,100-4,500
 €2,900-4,200

VARIOUS PROPERTIES

183

AN ENGLISH 9-INC GLOBE

SMITH & SON, CIRCA 1860

the cartouche *SMITH'S TERRESTRIAL GLOBE*
Containing all the MOST RECENT DISCOVERIES
LONDON/ SMITH & SON, 63 CHARING CROSS
comprised of twelve gores, with brass hour ring to pole,
supported in graduated brass meridian ring on tripod
stand with engraved paper horizon circle.

15in. (39cm.) high

£800-1,200

\$1,300-1,800
€1,200-1,700



183



184

***184**

A BOHEMIAN CLASSROOM GLOBE

FELKL, LATE 19TH CENTURY

the 12-inch terrestrial globe, opening to reveal black
painted interior with two suspension hooks, the
cartouche *ZEMEKOULE. Tiskem a nakladem vy d alo J.*
FELKL a SYN Jovarna na pomucky ucebne v Roztok ach u
prahy

25in. (64cm.) high

£1,500-2,500

\$2,300-3,800
€2,200-3,500



185

***185**
AN AMERICAN TELLURIAN
 VETTER CO, CIRCA 1930

signed to the base *THE VETTER CO BUFFALO N.Y.* with 4-inch terrestrial globe and arm for Venus in original carrying case — with instruction manual *Livre d'instruction pour le planetarium ideal* (The Vetter Co., Bridgeburg, Ontario; n.d.) 22½in. (57cm.) wide in case

£1,000–1,500

\$1,600–2,300

€1,500–2,100

***186**
AN AMERICAN PLANETARIUM
 LAING, LATE 19TH CENTURY

the wooden frame with complex pulley system for Venus, Moon and Earth which is a 3-inch terrestrial globe with chromolithographed gores, signed to plaque on arm *LAING'S PLANETARIUM PATENTED LAING PLANETARIUM CO. DETROIT, MICH U.S.A.*

17in. (43cm.) wide

£3,000–5,000

\$4,600–7,500

€4,300–7,000



186

***187**

AN ORRERY

AMERICAN, CIRCA 1890

the geared mechanism and crank handle, the eight arms supporting: Mercury; Venus; painted Earth and Moon; Mars with two satellites; Jupiter with four satellites; Saturn with two rings and eight satellites; Uranus with four satellites and Neptune with six, supported on lacquered brass column with folding tripod feet

24½ in. (62cm.) high

£7,000-10,000

\$11,000-15,000

€9,900-14,000





*188

A TELLURIUM-LUNARIUM

PROBABLY BY ADOLF MANG, CIRCA 1895

the 6½ -inch globe with chromolithgraphed gores bearing horu scale 1-12-1-12 and degree scale 0-180°-0-180°, graduated meridian, with geared mechanism on case iron stand, in carrying case fitted for larger components 23½in. (60cm.) wide in case

£2,000-3,000

\$3,100-4,500
€2,900-4,200



189

***189**

A BOHEMIAN TELLURIAN

LATE 19TH CENTURY

serial number 99, the 2-inch terrestrial globe with lithographed gores, oil lamp with green glass reservoir over calendrical dial, the geared mechanism on cast iron stand, signed to the arm *J. FELK PRAG* 23in. (59cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500

***190**

A SWEDISH TELLURIAN

SVANSTROM & RYLANDER, LATE 19TH CENTURY

the 4-inch terrestrial globe by Schotte with lithographed gores, candle holder over calendrical dial, the geared mechanism on cast iron base signed *SVANSTROM & RYLANDER STOCKHOLM.* 23in. (59cm.) wide

£1,500-2,500

\$2,300-3,800

€2,200-3,500



190



191
A MECHANICAL ARMILLARY SPHERE
VULLIAMY, EARLY 19TH CENTURY

the wooden base with crank handle signed *VULLIAMY LONDON*, the brass plate carrying a 3-inch armillary sphere with graduated equator, and colures, engraved tropics and ecliptic with zodiacal scale
6 x 8in. (15 x 20cm.)

£3,000-5,000

\$4,600-7,500
€4,300-7,000

A rare didactic instrument, probably intended for didactic use.



192

***192**

A WHIRLING TABLE

GERMAN, LATE 19TH CENTURY

signed to plaque *FERDINAND ERNECKE BERLIN TEMPELHOF*, the crank handle wheel turning an apparatus to demonstrate centrifugal forces, with legs to vertical or horizontal display.

20½in. (52cm.) long

£600-900

\$910-1,400

€840-1,300

***193**

A MAGNETIC GLOBE DEMONSTRATION APPARATUS

PHILIP HARRIS, EARLY 20TH CENTRY

the 6-inch parquetry globe with brass axis, cathode and anode, fitting in square wooden box with horizontal plate for iron filings, maker's plaque to side *PHILIP HARRIS Ltd BIRMINGHAM*.

11in. (27.5cm.) wide

£600-900

\$910-1,400

€840-1,300



193

SCIENTIFIC INSTRUMENTS (LOTS 194-223)



194

***194**
A CONTO 8-DIAL MECHANICAL ADDING MACHINE

CARL LANDOLT, CIRCA 1910

signed on the left of brass plate *Conto MODELL C. CARL LANDOLT Rechenmaschinen THALWIL b/ZÜRICH PATENT*, serial number 1596, eight input indicators each with two viewing windows, in original felt lined case 14in. (36cm.) wide in case

£1,000-1,500

\$1,600-2,300
 €1,500-2,100

***195**
AN HC-9 CIPHER MACHINE

AB TRANSVERTEX; SWEDEN, CIRCA 1950

serial number plaque *M 3858-301010 KRYAPP 301 TRAEX HC 9 24750*, the five rotor machine in green rubber carrying case.

7 x 8 x 3½ in. (17 x 21 x 9cm.) in case

£1,500-2,500

\$2,300-3,800
 €2,200-3,500

LITERATURE:

<http://www.cryptomuseum.com/crypto/transvertex/hc9/>

Designed for relatively low level military use by the Swedish forces, the HC-9 was also well used in South American. It embodied some new ideas in mechanical cryptography with alleged high resistance to cryptanalysis. The rear of the machine features a series of pins, combinations of which would be depressed by a punch key-card and the front window would have shown a randomised alphabet pairing on a rotating alphabet sheet of 16 lines. These the alphabet sheets and key cards were destroyed by the Swedish government when the HC-9s were declassified.



195





196
A RARE K-MODEL ENIGMA CIPHER MACHINE
 HEIMSOETH & RINKE, CIRCA 1936

Number K240, with complete electrical wiring, four aluminium rotors (one of which acts as a completely adjustable reflector) stamped I-III raised 'QWERTZ' keyboard with crackle black painted metal case, in wooden carrying case with green night-time
 13 x 11 x 6in. (33 x 28 x 15cm.)

£60,000-90,000

\$91,000-140,000
 €85,000-130,000

The three-rotor Enigma is the standard German electro-mechanical ciphering machine widely used in World War II. It derives from a 1918 patent by Dr. Arthur Scherbius and was bought out by the German military in 1929 and placed in service. Enigma in several variants was used by the German Navy, the Wehrmacht, the Luftwaffe, the state railroad system (who used a variant of the K Enigma with the notches swapped on rotors I and III, the *Abwehr* (intelligence) and the SS. Enigmas that were made in the 1930s and used by the military were used to hide the build-up of the German Army before WWII. This build-up was expressly forbidden by the Versailles treaty.

It was designed with a complex, interchangeable series of three rotors bearing the 26-character alphabet, a 'reflector' and a plugboard with movable connecting cords that

connected pairs of letters. As an added precaution, the base or starting settings for the rotors was changed every 24 hours, according to pre-printed code books furnished in advance or supplied daily by courier. It has been calculated that the 3-rotor ENIGMA, with plugboard in use, made possible a total of 15 billion billion possible readings for each character.

Enigma was widely regarded by the Germans as too complex to be broken, but in the 1930s a team of Polish analysts (Marian Rejewski, Jerzy Rozycki and Henryk Zygalski) made remarkable progress in working out the machine's basic system, identified its vulnerabilities and succeeded in deciphering much of the encrypted German radio traffic. Their findings, including plans for very useful mechanical devices known as 'bombes', which aided in the decryption operation, were secretly passed on in 1939 to French and British investigators. An elite team of cryptanalysts, mathematicians and engineers including Alan Turing (1912-54) were established in a top-secret facility at Bletchley Park. For the rest of the war that legendary team's heroic and unstinting efforts gradually accomplished the seemingly insurmountable task of deciphering an enormous volume of encrypted communications. The critical intelligence deriving from their decipherment was dubbed ULTRA and was employed cautiously but to great effect during the war; some commentators credit ULTRA with shortening the war by some two years.

Very few Enigma machines survived the war and it is particularly unusual to find one that was made in the 1930s that remained in such good condition. During WWII many of the Enigma machines were destroyed in military actions; near the end of the war the Germans destroyed their remaining Enigma machines as they retreated rather than have them captured by the Allies. After the end of the war, Churchill ordered that all remaining Enigma machines were to be destroyed.

Since the Allied breaking of the Enigma codes was not revealed for 30 years, some surviving Enigmas were put into service for a second time after the war by the BMDi, the *Bundesministerium der Innern* (Federal Ministry of the Interior) or the BGS, the *Bundesgrenzschutz* or the BND (Bundesnachrichtendienst). The BMDi and the BGS used the Enigmas to encipher names and birthdays etc. of persons whom they caught trying to illegally cross the borders of Germany after WWII especially in the area of the border to the east and the BND used Enigmas in security and police work. These post-war German foreign intelligence agencies refurbished some of the few surviving Enigmas with new paint and maintained and used the machines for many years after the end of WWII and into the Cold War era.



197
A THREE-ROTOR ENIGMA CIPHER MACHINE
 KONSKI & KRUEGER

number A8208, with complete electrical wiring, three matching aluminum rotors II, IV, V, raised 'QWERTZ' keyboard with crackle black painted metal case, plugboard in the front with sixpatch leads, 12½ x 10 x 5½in. (32 x 26 x 14cm.)

£40,000-60,000

\$61,000-90,000
 €57,000-84,000

For further information this lot, please visit www.christies.com



198

***198**
McFARLANE'S CALCULATING CYLINDER
 SCOTTISH, CIRCA 1835

the composed of three rotating sections with printed paper scales, cartouche signed *McFARLANE'S CALCULATING CYLINDER. GLASGOW.*

6in. (15cm.) long

£2,000-3,000

\$3,100-4,500
 €2,900-4,200

This slide rule in the form of a cylinder would have been used to determine interest for fiscal calculations. Other examples are known in the collections of IBM and the Science Museum in London.

***199**
A FRENCH SURVEYOR'S COMPASS
 SECRETAN, MID 19TH CENTURY

signed to the brass telescope *Secretan à Paris*, in a mahogany box the four-point compass rose with scale 0-360°, half-blued needle and bubble level, supported on brass mount with ball and socket joint.

9in. (23cm.) high

£600-900

\$910-1,400
 €840-1,300



199



200



200 (detail)

***200**
DOUBLE REFRACTION APPARATUS
 FRENCH, 19TH CENTURY

signed *M. on. Jules Duboscq Ph Pellin Paris*, screw mechanism for rotating disc 0-180-0 with vernier, hinged on compass joint on lacquered brass column on cast iron tripod case, marked with O.3.
 20in. (49cm.) high

£1,500-2,500

\$2,300-3,800
 €2,200-3,500



201

***201**
A 3-INCH REFRACTING TELESCOPE
 DOLLOND, EARLY 19TH CENTURY

The 2-foot long body tube bound in leather, signed on the draw *Dollond London* with ownership inscription *Edward Gryffydd Peacock Indian Navy* in original oak case with key
 28in. (72cm.) long

£1,500-2,500

\$2,300-3,800
 €2,200-3,500

PROVENANCE:

Edward Gryffydd Peacock (1825-67)



202

***202**

A LARGE GALVANOMETER

BAIRD & TATLOCK, CIRCA 1910

between the two wooden wire bearing circles, a silvered dial, signed on ivory plaque *BAIRD & TATLOCK GLASGOW AND EDINBURGH*, with six brass terminals, rotating on wooden base.

14½in. (36cm.) high

£700-1,000

\$1,100-1,500

€980-1,400



203

***203**

DAY OR NIGHT TELESCOPE

DOLLOND, 1891

the leather-bound brass, one

draw, 2½-inch refracting, signed

Dollond London, Day or Night, 6847.

ROYAL NATIONAL LIFE-BOAT

INSTITUTION. 1891.

21in. (54cm.) long

£600-900

\$910-1,400

€840-1,300



203 (detail)



204

***204**

A GRIFFITH "CLUB" MICROSCOPE

AMERICAN, LATE 19TH CENTURY

signed on base *E.H. GRIFFITH*
FAIRPORT N.Y. PAT.DEWC.14,86.
 serial number 850 to base and inside lid
 of red felt-lined fitted case, the body
 in lacquered brass, two aluminium
 canisters for objective lenses.
 9½in. (23cm.) wide in case

£1,500-2,500

\$2,300-3,800
 €2,200-3,500

***205**

A GALVANOMETER

ELLIOTT BROS., EARLY 20TH CENTURY

signed to top *Elliott Bros. London. 297*
 in brass glazed box on bakelite, with
 bubble level, in original wooden case
 12in. (36cm.) high in case

£700-1,000

\$1,100-1,500
 €980-1,400



205



206

***206**
AN AMERICAN LACQUERED BRASS MICROSCOPE
 BAUSCH & LOMB, POST-1876

signed *BAUSCH & LOMB OPTICAL Co PAT. OCT 3. 1876.* the monocular body tube with rack and pinion focus with fine-focus screw to limb, black lacquered tripod foot, with two objectives, two eyepieces and small drawer of accessories, printed paper table for line magnifying powers to door, *Microscope No. 1995*, in original wooden case
 12in. (30cm.) high in case

£600-900

\$910-1,4
 €840-1,3

***207**
AN AMERICAN MICROSCOPE
 GEORGE WALE, CIRCA 1876

The brass monocular microscope on cast iron foot, signed to the stage *GEO. WALE PAT. JUNE 6. 1876.* the twp objectives marked *HISTOLOGICAL SERIES*, in fitted wooden case.

14in. (36cm.) high in case

£600-900

\$910-1,400
 €840-1,300



207



208

***208**
AN ENGLISH CIRCUMFERENTOR
 HENRY EDGWORTH, CIRCA 1780

the brass alidade with vernier for scale 0-360°, the glazed compass with another brass degree scale and a printed 32-point rose with 0-90°-0-90° signed *H EDGWORTH MAKER BRISTOL*

7in. (18cm.) diameter

£700-1,000

\$1,100-1,500
 €980-1,400

***209**
A BRASS AND MARBLE CANNON DIAL OR NOON GUN
 K. BERENT, MID 19TH CENTURY

signed *K. BERENT* to the circular marble base engraved with horizontal dial IV-XII-VIII, and *M.C.W.U W. WARSZAWIE*, brass gnomon, mortar, lens on two arms, one quadrant arc marked with calendrical scale, on later wooden base.

7in. (18cm.)

£1,000-1,500

\$1,600-2,300
 €1,500-2,100

PROVENANCE:

Charles Millter Ltd., 26 October 2011, lot 167



209



210

***210**
AN AMERICAN SURVEYOR'S
COMPASS
 LATE 18TH CENTURY

The wooden body of the circumferentor with trough compass and graduated brass scale 0–90°–0 for alidade that screws to side when not in use.

11½in. (29cm.) wide

£700–1,000

\$1,100–1,500
 €980–1,400

***211**
AN AIR PUMP
 ALOIS KREIDL, PRAGUE; 19TH CENTURY

the lacquered brass mechanism on walnut veneered base with maker's (or retailer's) plaque, with old collection labels and painted inventory numbers — with a domed alarm clock with electrical contacts, to demonstrate conditions in vacuum.

19in. (48cm.) long

£1,000–1,500

\$1,600–2,300
 €1,500–2,100



211



***212**
AN AMERICAN SURVEYOR'S
COMPASS
 1790

The circumferentor with wooden body, dated to reverse 1790, brass degree scale 0-90°-0, the alidade secured to sides with screw hold when not in use, blued compass needle in glazed recess.
 9in. (23cm.) long

£800-1,200

\$1,300-1,800
 €1,200-1,700

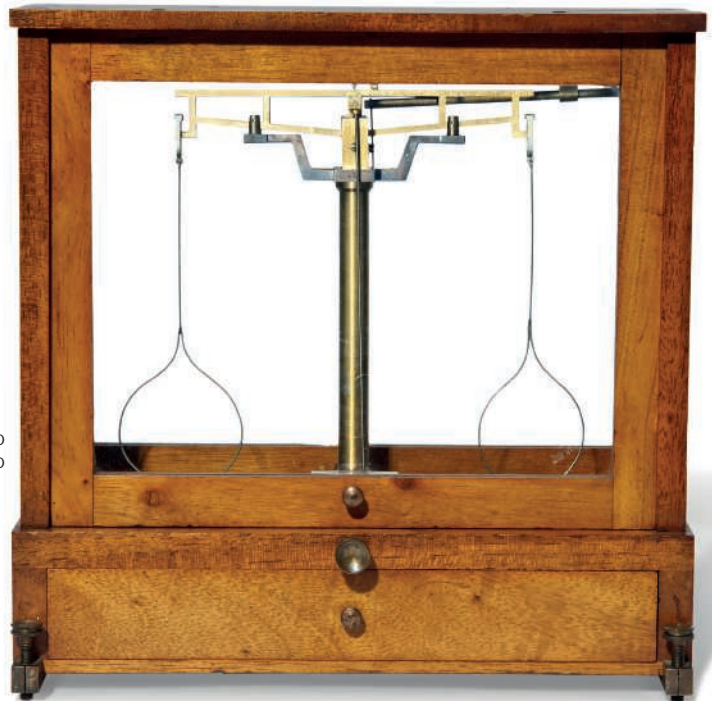
212

***213**
A MINIATURE ASSAY BALANCE
 PROBABLY BY H. KOHLBUSCH, LATE
 19TH CENTURY

The scales in glazed case, agate topped screws, weights and accessories in drawer.
 9½in. (24cm.) high

£600-900

\$910-1,400
 €840-1,300



213



214



214 (detail of signature)

***214**

CROOKES TUBE

CASELLA, LATE 19TH CENTURY

the triple bulbed tube of uranium glass signed *Crookes Radiant Matter Tube 3 inch Spark No 2a L. Casella London*

5in. (13cm.) long

£800-1,200

\$1,300-1,800

€1,200-1,700

***215**

A LACQUERED BRASS SPECTROSCOPE

JOHN BROWNING, LATE-19TH CENTURY

signed *John Browning LONDON*
the horizontal circle with 0-140° scale and vernier, raised on a brass column from a splayed tripod foot, in original fitted mahogany case.
1 5/8 in. (38cm.) high in case

£600-900

\$910-1,400

€840-1,300



215



216

***216**

A SURGICAL SET

MAW & SON, CIRCA 1880

each piece stamped S. MAW & SON
LONDON & THOMPSON, the set
complete in fitted felt-lined case
16in. (41cm.) long in case

£700-1,000

\$1,100-1,500

€980-1,400

***217**

AN AMERICAN SURGICAL SET

A.S. ALOE, LATE 19TH CENTURY

the large steel instruments
stamped with maker's mark, in
fitted case with label A.S.ALOE-
CO MANUFACTURERS OF
SURGICAL INSTRUMENTS 415
N.BROADWAY ST. LOUIS
15in. (38cm.)

£700-1,000

\$1,100-1,500

€980-1,400



217



218

218
FOUR-VANE SURVEYING CIRCLE

PIERRE SEVIN, 1672

the brass body with two non-linear scales below signature *Pierre Sevin APairs 1672*, the circumference with two scales 0-180°-0, the inner divided to 1/2°, an eight point compass rose to alidade
7 1/2 in. (19 cm.) diam.

£2,000-3,000

\$3,100-4,500
€2,900-4,200

-219
A CABINET OF MICROSCOPE SLIDES

ENGLISH, 19TH CENTURY

seven drawers with ivory handles, approximately 40 slides in each of the six drawers including five microphotographs
16 in. (41 cm.) high

£1,000-1,500

\$1,600-2,300
€1,500-2,100



219



-220

AN IVORY DIPTYCH DIAL

GERMAN, 1607

scale for high tides to leaf 1a, dated 1607 above painted miniature on leaf 1b,
hour scale and paper compass to leaf 2a, scale for lunar age to leaf 2b
2½in. (6.5cm.) long

£3,000-5,000

\$4,600-7,500

€4,300-7,000

Related to a small group of sundials made in Germany for the Spanish market, e.g. AST0431 at the Royal Museums Greenwich & Inv. no. 86396 at the Museum of the History of Science, Oxford.

PROPERTY OF MR. & MRS. T. PARKER

-221

A CASÉD BREWSTER STEREOSCOPIC VIEWER

T. R. WILLIAMS, CIRCA 1870

signed on ivory plaque *T.R. WILLIAMS 236 REGENT ST* with 47 cards, of which two are tintypes signed on the reverse *London & Paris Stereoscopic Agency 302 Regent St. & South Gallery Crystal Palace*

12in. (30cm.) wide

(3)

£1,000-1,500

\$1,600-2,300

€1,500-2,100

PROVENANCE:

Thomas Augustus Wolstenholme Parker, 6th Earl of Macclesfield (1811-1896), Shirburn Castle, Oxfordshire.

Thence by descent at Shirburn Castle





222

VARIOUS PROPERTIES

222

A PAIR OF BRASS AND STEEL TIPPED GUNNER'S CALLIPERS

GERMAN, 18TH CENTURY

inscribed *Visirung des feuer gewehrs der Infanterie Nachiotheit des Numb: Zolls.* to the front with five scales, the reverse with further five

8 $\frac{3}{4}$ in. (22cm.) long

£1,000-1,500

\$1,600-2,300

€1,500-2,100

a few light scratches and finger marks etched to the patina, else very good condition

-223

SHAGREEN CASE OF DRAWING INSTRUMENTS

GEORGE ADAMS JR, CIRCA 1770

the complete set of instruments with ivory rule for *Hanoverian French Roman* and *English* inches, ivory protractor signed *Geo: Adams. No.60.Fleet. Street,London* and ivory sector signed *G Adams London* 5in. (13cm.) high

£1,500-2,500

\$2,300-3,800

€2,200-3,500



223

(v) the storage terms which can be found at christies.com/storage shall apply.
(w) Nothing in this paragraph is intended to limit our rights under paragraph F4.

H TRANSPORT AND SHIPPING

1 TRANSPORT AND SHIPPING

We will enclose a transport and shipping form with each invoice sent to you. You must make all transport and shipping arrangements. However, it may be appropriate to pack, transport and ship your property if you ask us to and pay the costs of doing so. We recommend that you ask us for an estimate, especially for any large items or items of high value that need professional packing before you bid. We may also suggest other reliable packing, transporters or experts if you ask us to do so. For more information, please contact Christie's Art Transport on +44 (0)20 7839 9060. See the information set out at www.christies.com/shipping or contact us at arttransport.london@christies.com. We will take reasonable care when we are handling, packing, transporting and shipping a lot. However, if we recommend another company for any of these purposes, we are not responsible for their acts, failure to act or neglect.

2 EXPORT AND IMPORT

Any lot sold at auction may be affected by laws on exports from the country in which it is sold and the import restrictions of other countries. Many countries require a declaration of export for property leaving the country and/or an export declaration on arrival of property into the country. Local laws may prevent you from importing a lot or may prevent you selling a lot in the country you import it into.

(a) You alone are responsible for getting advice about and meeting the requirements of any laws or regulations which apply to importing or importing a lot prior to bidding, or to obtaining a licence or there is a delay in getting one, you must still pay us in full for the lot. We may be able to help you apply for the appropriate licences if you ask us to and pay our fee for doing so. However, we cannot guarantee that you will get one. For more information, please contact Christie's Art Transport Department on +44 (0)20 7839 9060. See the information set out at www.christies.com/shipping or contact us at arttransport.london@christies.com.

(b) Lots made of protected species

Lots made of or including (regardless of the percentage) endangered and other protected species of wildlife are marked with the symbol ∇ in the catalogue. This material includes, among other things, ivory, tortoiseshell, crocodile skin, rhinoceros horn, whalebone, certain species of coral, and Brazilian rosewood. You should check the relevant customs laws and regulations before bidding on any lot containing wildlife material if you plan to import the lot into another country. Several countries refuse to allow you to import property containing these materials, and some other countries require a licence from the relevant regulatory agencies in the countries you wish to import the material into. In some cases, the lot can only be shipped with an independent scientific confirmation of species and/or age and you will need to obtain these at your own cost. If a lot contains elephant ivory, or any other wildlife material that could be confused with elephant ivory (for example, mammoth ivory, walrus ivory, helmeted hornbill ivory), please see further important information in paragraph (c) if you are proposing to import the lot into the USA. We will not be obliged to cancel your purchase and refund the purchase price if your lot may not be exported, imported or if it is seized for any reason by a government authority. It is your responsibility to determine and satisfy the requirements of any applicable laws or regulations relating to the export or import of property containing such protected or regulated species.

(c) US Import ban on African elephant ivory

The USA prohibits the import of ivory from the African elephant. Any lot containing elephant ivory or other wildlife material that could be easily confused with elephant ivory (for example, mammoth ivory, walrus ivory, helmeted hornbill ivory) can only be imported into the US with results of a rigorous scientific test acceptable to Fish & Wildlife, which confirms that the material is not African elephant ivory. Where we have conducted such rigorous scientific testing on a lot prior to sale, we will make this clear in the lot description. In all other cases, we cannot confirm whether a lot contains African elephant ivory, and you will buy that lot at your own risk and be responsible for any scientific test or other reports required for import into the USA at your own cost. If such scientific test is inconclusive or confirms that the material is from the African elephant, we will not be obliged to cancel your purchase and refund the purchase price.

(d) **Lots containing material that originates from Burma (Myanmar)** Lots which contain rubies or jadeite originating in Burma (Myanmar) may not generally be imported into the United States. As a convenience to US buyers, lots which contain rubies or jadeite of Burma or indeterminate origin have been marked with the symbol ∇ in the catalogue. In relation to items that contain any other types of gemstones originating in Burma (e.g. sapphires) such items may be imported into the United States provided that the gemstones have been mounted or incorporated into jewellery outside of Burma and provided that the setting is not of a temporary nature (e.g. a string).

(e) Lots of Iranian origin

Some countries prohibit or restrict the purchase and/or import of Iranian-origin works of conventional craftsmanship (works that are not by a recognised artist and/or that have a function, for example: bowls, ewers, tiles, ornamental boxes). For example, the USA prohibits the import of this type of property and its purchase by US persons (whereas, for example, other countries, such as Canada, may only permit the import of this property in certain circumstances. As a convenience to buyers, Christie's indicates under the title of a lot if the lot originates from Iran (Persia). It is your responsibility to ensure you do not bid on or import a lot in contravention of the sanctions or trade embargoes that apply to you.

(f) Gold

Gold of less than 18ct does not qualify in all countries as 'gold' and

may be refused import into those countries as 'gold'.

(g) Jewellery over 50 years old

Under current laws, jewellery over 50 years old which is worth £24,300 or more will require an export licence which we can apply for on your behalf. It may take up to eight weeks to obtain the export jewellery licence.

(h) Watches

(i) Many of the watches offered for sale in this catalogue are pictured with straps made of endangered or protected animal materials such as alligator or crocodile. These lots are marked with the symbol ∇ in the catalogue. These endangered species straps are shown for display purposes only and are not for sale. Christie's will remove and retain the strap prior to shipment from the sale site. At some sales, Christie's may, at its discretion, make the displayed endangered species strap available to the buyer of the lot free of charge if collected in person from the sale site within one year of the date of the sale. Please check with the department for details on a particular lot.

All symbols and other markings referred to in paragraph H2, please note that lots are marked as a convenience to you, but we do not accept liability for errors or for failing to mark lots.

I OUR LIABILITY TO YOU

(a) We give no warranty in relation to any statement made, or information given, by us or our representatives or employees, about any lot other than as set out in the authenticity warranty and, as far as we are allowed by law, all warranties and other terms which may be added to this agreement by law are excluded. The seller's warranties contained in paragraph E1 are their own and we do not have any liability to you in relation to those warranties.

(b) We are not responsible to you for any reason (whether for breaking this agreement or any other matter relating to your purchase of, or bid for, any lot) other than in the event of fraud or fraudulent misrepresentation by us or other than as expressly set out in these Conditions of Sale or:

(i) give any representation, warranty or guarantee or assume any liability of any kind in respect of any lot with regard to merchantability, fitness for a particular purpose, description, size, quality, condition, attribution, authenticity, rarity, importance, medium, provenance, exhibition history, literature, or historical relevance, except as required by local law, any warranty of any kind is excluded by this paragraph.

(c) In particular, please be aware that our written and telephone bidding services, Christie's LIVE™, condition reports, currency converter and saleroom video screens are free services and we are not responsible to you for any error (human or otherwise), omission or breakdown in these services.

(d) We have no responsibility to any person other than a buyer in connection with the purchase of any lot.

(e) If, in spite of the terms in paragraphs (a) to (d) or E2(i) above, we are found to be liable to you for any reason, we shall not be obliged to pay more than the purchase price paid by you to us. We will not be responsible to you for any reason for loss of profits or business, loss of opportunity or value, expected savings or interest, costs, damages, or expenses.

J OTHER TERMS

1 OUR ABILITY TO CANCEL

In addition to the other rights of cancellation contained in this agreement, we can cancel a sale of a lot if we reasonably believe that completing the transaction is, or may be, unlawful or that the sale places us or the seller under any liability to anyone else or may damage our reputation.

2 RECORDINGS

We may videotape and record proceedings at any auction. We will keep any personal information confidential, except to the extent disclosure is required by law. However, we may, through this process, use or share these recordings with another Christie's Group company and marketing partners to analyse our customers and to help us to tailor our services for buyers. If you do not want to be videotaped, you may make arrangements to make a telephone or written bid or bid on Christie's LIVE™ instead. Unless we agree otherwise in writing, you may not videotape or record proceedings at any auction.

3 COPYRIGHT

We own the copyright in all images, illustrations and written material produced by or for us relating to a lot (including the contents of our catalogues unless otherwise noted in the catalogue). You cannot use them without our prior written permission. We do not offer any guarantee that you will gain any copyright or other reproduction rights to the lot.

4 ENFORCING THIS AGREEMENT

If a court finds that any part of this agreement is not valid or is illegal or impossible to enforce, that part of the agreement will be treated as being deleted and the rest of this agreement will not be affected.

5 TRANSFERRING YOUR RIGHTS AND RESPONSIBILITIES

You may not grant a security over or transfer your rights or responsibilities under these terms on the contract of sale with the buyer unless we have given our written permission. This agreement will be binding on your successors or estate and anyone who takes over your rights and responsibilities.

6 TRANSLATIONS

If we have provided a translation of this agreement, we will use this original version in deciding any issues or disputes which arise under this agreement.

7 PERSONAL INFORMATION

We will hold and process your personal information and may pass it to another Christie's Group company for use as described in, and in line with, our privacy policy at www.christies.com.

8 WAIVER

No failure or delay to exercise any right or remedy provided under the Conditions of Sale shall constitute a waiver of that or any other right or remedy, nor shall it prevent or restrict the further exercise of that or any other right or remedy. No single or partial exercise of such right or remedy shall prevent or restrict the further exercise of that or any other right or remedy.

9 LAW AND DISPUTES

This agreement, and any non-contractual obligations arising out of or in connection with this agreement, or any other rights you may have relating to the purchase of a lot will be governed by the laws of England and Wales. Before we or you start any court proceedings (in any of the limited circumstances where the dispute, controversy or claim is related to proceedings brought by someone else and this dispute could be joined to those proceedings), we agree we will each try to settle the dispute by mediation following the Centre for Effective Dispute Resolution (CEDR) Model mediation Procedure. We will use a mediator affiliated with CEDR who we and you agree to. If the dispute is not settled by mediation, you agree for our benefit that the dispute will be referred to and dealt with exclusively in the courts of England and Wales. However, we will have the right to bring proceedings against you in any other court.

10 REPORTING ON WWW.CHRISTIES.COM

Details of all lots sold by us, including catalogue descriptions and prices, may be reported on www.christies.com. Sales totals are hammer price plus buyer's premium and do not reflect costs, financing fees, or application of buyer's or seller's credits. We regret that we cannot agree to requests to remove these details from www.christies.com.

K GLOSSARY

authentic: a genuine example, rather than a copy or forgery of:
(i) the work of a particular artist, author or manufacturer, if the lot is described in the Heading as the work of that artist, author or manufacturer;

(ii) a work created within a particular period or culture, if the lot is described in the Heading as a work created during that period or culture;

(iii) a work for a particular origin source if the lot is described in the

Heading as being of that origin or source; or

(iv) in the case of gems, a work which is made of a particular material, if the lot is described in the Heading as being made of that material.

authenticity warranty: the guarantee we give in this agreement that a lot is authentic as set out in section E2 of this agreement.

buyer's premium: the charge the buyer pays us along with the hammer price.

catalogue description: the description of a lot in the catalogue for the auction, as amended by any saleroom notice.

Christie's Group: Christie's International Plc, its subsidiaries and other companies within its corporate group.

condition: the physical condition of a lot.

date: has the meaning given to it in paragraph F1(a).

estimate: the price range included in the catalogue or any saleroom notice within which we believe a lot may sell. **Low estimate** means the lower figure in the range and **high estimate** means the higher figure. The **mid estimate** is the midpoint between the two.

hammer price: the amount of the highest bid the auctioneer accepts for the sale of a lot.

Heading: has the meaning given to it in paragraph E2.

lot: an item to be offered at auction (or two or more items to be offered at auction as a group).

other damages: any special, consequential, incidental or indirect damages of any kind or any damages which fall within the meaning of 'special', 'incidental' or 'consequential' under local law.

purchase price: has the meaning given to it in paragraph F1(a).

provenance: the ownership history of a lot.

qualified: has the meaning given to it in paragraph E2 and **Qualified Headings** means the section headed **Qualified Headings** on the page of the catalogue headed 'Important Notices and Explanation of Cataloguing Practice'.

reserve: the confidential amount below which we will not sell a lot.

saleroom notice: a written notice posted next to the lot in the saleroom and on www.christies.com, which is also read to prospective telephone bidders and notified to clients who have left commission bids, or an announcement made by the auctioneer either at the beginning of the sale, or before a particular lot is auctioned.

UPPER CASE type: means having all capital letters.

warranty: a statement or representation in which the person making it guarantees that the facts set out in it are correct.

VAT SYMBOLS AND EXPLANATION

You can find a glossary explaining the meanings of words coloured in bold on this page at the end of the section of the catalogue headed 'Conditions of Sale'

VAT payable

Symbol	
No Symbol	We will use the VAT Margin Scheme. No VAT will be charged on the hammer price . VAT at 20% will be added to the buyer's premium but will not be shown separately on our invoice.
†	We will invoice under standard VAT rules and VAT will be charged at 20% on both the hammer price and buyer's premium and shown separately on our invoice.
θ	For qualifying books only, no VAT is payable on the hammer price or the buyer's premium .
*	An amount in lieu of the import tax is applied to the hammer price and is at the reduced rate of 5%. Vat is charged at 20% on the buyer's premium but will not be shown separately on the invoice. These lots have been imported from outside of the EU for sale and placed under the Temporary Admission regime.
Ω	An amount in lieu of the import tax is applied to the hammer price and is at the standard rate of 20%. Vat is also charged at 20% on the buyer's premium but will not be shown separately on the invoice. Where applicable Customs duty will be charged (as per the rate specified by HMRC guidance) on the hammer price and VAT will be payable at 20% on the customs duty. These lots have been imported from outside of the EU for sale and placed under the Temporary Admission regime.
α	The VAT treatment will depend on whether you have registered to bid with an EU or non-EU address: <ul style="list-style-type: none"> • If you register to bid with an address within the EU you will be invoiced under the VAT Margin Scheme (see No Symbol above). • If you register to bid with an address outside of the EU you will be invoiced under standard VAT rules (see † symbol above)
‡	For wine offered 'in bond' only. If you choose to buy the wine in bond no Excise Duty or Clearance VAT will be charged on the hammer . If you choose to buy the wine out of bond Excise Duty as applicable will be added to the hammer price and Clearance VAT at 20% will be charged on the Duty inclusive hammer price . Whether you buy the wine in bond or out of bond, 20% VAT will be added to the buyer's premium and shown on the invoice.

VAT refunds: what can I reclaim?

If you are:

A non VAT registered UK or EU buyer		No VAT refund is possible
UK VAT registered buyer	No symbol and α	The VAT amount in the buyer's premium cannot be refunded. However, on request we can re-invoice you outside of the VAT Margin Scheme under normal UK VAT rules (as if the lot had been sold with a † symbol). Subject to HMRC's rules, you can then reclaim the VAT charged through your own VAT return.
	* and Ω	Subject to HMRC's rules, you can reclaim the Import VAT charged on the hammer price through your own VAT return when you are in receipt of a C79 form issued by HMRC. The VAT amount in the buyer's premium is invoiced under Margin Scheme rules so cannot normally be claimed back. However, if you request to be re-invoiced outside of the Margin Scheme under standard VAT rules (as if the lot had been sold with a † symbol) then, subject to HMRC's rules, you can reclaim the VAT charged through your own VAT return.
EU VAT registered buyer	No Symbol and α	The VAT amount in the buyer's premium cannot be refunded. However, on request we can re-invoice you outside of the VAT Margin Scheme under normal UK VAT rules (as if the lot had been sold with a † symbol). See below for the rules that would then apply.
	†	If you provide us with your EU VAT number we will not charge VAT on the buyer's premium . We will also refund the VAT on the hammer price if you ship the lot from the UK and provide us with proof of shipping, within three months of collection.
	* and Ω	The VAT amount on the hammer and in the buyer's premium cannot be refunded. However, on request we can re-invoice you outside of the VAT Margin Scheme under normal UK VAT rules (as if the lot had been sold with a † symbol). See above for the rules that would then apply.
Non EU buyer		If you meet ALL of the conditions in notes 1 to 3 below we will refund the following tax charges:
	No Symbol	We will refund the VAT amount in the buyer's premium .
	† and α	We will refund the VAT charged on the hammer price. VAT on the buyer's premium can only be refunded if you are an overseas business. The VAT amount in the buyer's premium cannot be refunded to non-trade clients.
	‡ (wine only)	No Excise Duty or Clearance VAT will be charged on the hammer price providing you export the wine while 'in bond' directly outside the EU using an Excise authorised shipper. VAT on the buyer's premium can only be refunded if you are an overseas business. The VAT amount in the buyer's premium cannot be refunded to non-trade clients.
	* and Ω	An amount in lieu of the Import VAT will be refunded on the hammer and an amount in lieu of the VAT in the premium will be refunded. Customs Duty when applicable is also reclaimable.

1. We **CANNOT** offer refunds of VAT amounts or Import VAT to buyers who do not meet all applicable conditions in full. If you are unsure whether you will be entitled to a refund, please contact Client Services at the address below **before you bid**.
2. No VAT amounts or Import VAT will be refunded where the total refund is under £100.
3. In order to receive

- a refund of VAT amounts/Import VAT (as applicable) non-EU buyers must:
- (a) have registered to bid with an address outside of the EU; **and**
 - (b) provide immediate proof of correct export out of the EU within the required time frames of: 30 days via a 'controlled export' for † and Ω **lots**. All other **lots** must be exported within three months of collection.

4. Details of the documents which you must provide to us to show satisfactory proof of export/shipping are available from our VAT team at the address below. We charge a processing fee of £35.00 per invoice to check shipping/export documents. We will waive this processing fee if you appoint Christie's Shipping Department to arrange your export/shipping.

5. If you appoint Christie's Art Transport or one of our authorised shippers to arrange your export/shipping we will issue you with an export invoice with the applicable VAT or duties cancelled as outlined above. If you later cancel or change the shipment in a manner that infringes the rules outlined above we will issue a revised invoice charging you all applicable taxes/charges.

6. If you ask us to re-invoice you under normal UK VAT rules (as if the **lot** had been sold with a † symbol) instead of under the Margin Scheme the **lot** may become ineligible to be resold using the Margin Schemes. You should take professional advice if you are unsure how this may affect you.

7. All invoicing requests must be received within four years from the date of sale. If you have any questions about VAT refunds please contact Christie's Client Services on info@christies.com
Tel: +44 (0)20 7389 2886.
Fax: +44 (0)20 7839 1611.

SYMBOLS USED IN THIS CATALOGUE

The meaning of words coloured in **bold** in this section can be found at the end of the section of the catalogue headed 'Conditions of Sale'.

o

Christie's has a direct financial interest in the lot. See Important Notices and Explanation of Cataloguing Practice.

△

Owned by Christie's or another **Christie's Group** company in whole or part. See Important Notices and Explanation of Cataloguing Practice.

◆

Christie's has a direct financial interest in the **lot** and has funded all or part of our interest with the help of someone else. See Important Notices and Explanation of Cataloguing Practice.

λ

Artist's Resale Right. See Section D3 of the Conditions of Sale.

•

Lot offered without **reserve** which will be sold to the highest bidder regardless of the pre-sale estimate in the catalogue.

~

Lot incorporates material from endangered species which could result in export restrictions. See Section H2(b) of the Conditions of Sale.

Ψ

Lot containing jadeite and rubies from Burma or of indeterminate origin. See Section H2(d) of the Conditions of Sale.

? , * , Ω , α , # , †

See VAT Symbols and Explanation.

■

See Storage and Collection Pages on South Kensington sales only.

Please note that **lots** are marked as a convenience to you and we shall not be liable for any errors in, or failure to, mark a **lot**.

IMPORTANT NOTICES AND EXPLANATION OF CATALOGUING PRACTICE

CHRISTIE'S INTEREST IN PROPERTY CONSIGNED FOR AUCTION

△ Property Owned in part or in full by Christie's

From time to time, Christie's may offer a **lot** which it owns in whole or in part. Such property is identified in the catalogue with the symbol △ next to its **lot** number.

o Minimum Price Guarantees

On occasion, Christie's has a direct financial interest in the outcome of the sale of certain lots consigned for sale. This will usually be where it has guaranteed to the Seller that whatever the outcome of the auction, the Seller will receive a minimum sale price for the work. This is known as a minimum price guarantee. Where Christie's holds such financial interest we identify such **lots** with the symbol o next to the **lot** number.

◆ Third Party Guarantees/Irrevocable bids

Where Christie's has provided a Minimum Price Guarantee it is at risk of making a loss, which can be significant, if the **lot** fails to sell. Christie's therefore sometimes chooses to share that risk with a third party. In such cases the third party agrees prior to the auction to place an irrevocable written bid on the **lot**. The third party is therefore committed to bidding on the **lot** and, even if there are no other bids, buying the **lot** at the level of the written bid unless there are any higher bids. In doing so, the third party takes on all or part of the risk of the **lot** not being sold. If the **lot** is not sold, the third party may incur a loss. **Lots** which are subject to a third party guarantee arrangement are identified in the catalogue with the symbol ◆.

The third party will be remunerated in exchange for accepting this risk based on a fixed fee if the third party is the successful bidder or on the final hammer price in the event that the third party is not the successful bidder. The third party may also bid for the **lot** above the written bid. Where it does so, and is the successful bidder, the fixed fee for taking on the guarantee risk may be netted against the final purchase price.

Third party guarantors are required by us to disclose to anyone they are advising their financial interest in any **lots** they are guaranteeing. However, for the avoidance of any doubt, if you are advised by or bidding through an agent on a **lot** identified as being subject to a third party guarantee you should always ask your agent to confirm whether or not he or she has a financial interest in relation to the **lot**.

Other Arrangements

Christie's may enter into other arrangements not involving bids. These include arrangements where Christie's has given the Seller an Advance on the proceeds of sale of the **lot** or where Christie's has shared the risk of a guarantee with a partner without the partner being required to place an irrevocable written bid or otherwise participating in the bidding on the **lot**. Because such arrangements are unrelated to the bidding process they are not marked with a symbol in the catalogue.

Bidding by parties with an interest

In any case where a party has a financial interest in a **lot** and intends to bid on it we will make a saleroom announcement to ensure that all bidders are aware of this. Such financial interests can include where beneficiaries of an Estate have reserved the right to bid on a **lot** consigned by the Estate or where a partner in a risk-sharing arrangement has reserved the right to bid on a **lot** and/or notified us of their intention to bid.

Please see <http://www.christies.com/financial-interest/> for a more detailed explanation of minimum price guarantees and third party financing arrangements.

Where Christie's has an ownership or financial interest in every **lot** in the catalogue, Christie's will not designate each **lot** with a symbol, but will state its interest in the front of the catalogue.

POST 1950 FURNITURE

All items of post-1950 furniture included in this sale are items either not originally supplied for use in a private home or now offered solely as works of art. These items may not comply with the provisions of the Furniture and Furnishings (Fire) (Safety) Regulations 1988 (as amended in 1989 and 1993, the 'Regulations'). Accordingly, these items should not be used as furniture in your home in their current condition. If you do intend to use such items for this purpose, you must first ensure that they are reupholstered, restuffed and/or recovered (as appropriate) in order that they comply with the provisions of the Regulations.

BOOKS

If, on collation, any named item in this catalogue proves defective in text or illustration, the lot may be returned within 14 days of the sale with the defect stated in writing. This proviso shall not apply to defects stated in the catalogue or announced at the time of sale; nor to the absence of blanks, half titles, tissue guards or advertisements, damage in respect of bindings, stains, spotting, marginal tears, or other defects not affecting completeness of text or illustration; nor to drawings, autographs, letters or manuscripts, signed photographs, music, atlases, maps or periodicals; nor to books not identified by title; nor to lots sold without printed estimates or described in the catalogue as sold not subject to return. Buyers are advised to clear their lots within ten days of the sale or storage charges will be incurred.

Please note the Conditions of Sale printed at the end of this catalogue.

STORAGE AND COLLECTION

COLLECTION LOCATION AND TERMS

Specified **lots** (sold and unsold) marked with a filled square (■) not collected from Christie's by 5.00 pm on the day of the sale will, at our option, be removed to Cadogan Tate Ltd. Christie's will inform you if the **lot** has been sent offsite. Our removal and storage of the **lot** is subject to the terms and conditions of storage which can be found at Christies.com/storage and our fees for storage are set out in the table below - these will apply whether the **lot** remains with Christie's or is removed elsewhere.

If the **lot** is transferred to Cadogan Tate Ltd, it will be available for collection from 12 noon on the second business day following the sale.

Please call Christie's Client Service 24 hours in advance to book a collection time at Cadogan Tate Ltd. All collections from Cadogan Tate Ltd. will be by pre-booked appointment only.

Tel: +44 (0)20 7839 9060

Email: csollectionsuk@christies.com.

If the **lot** remains at Christie's it will be available for collection on any working day 9.00am to 5.00pm. **Lots** are not available for collection at weekends.

PAYMENT OF ANY CHARGES DUE

ALL lots whether sold or unsold may be subject to storage and administration fees. Please see the details in the table below. Storage Charges may be paid in advance or at the time of collection. **Lots** may only be released on production of the 'Collection Form' from Christie's. **Lots** will not be released until all outstanding charges are settled.

SHIPPING AND DELIVERY

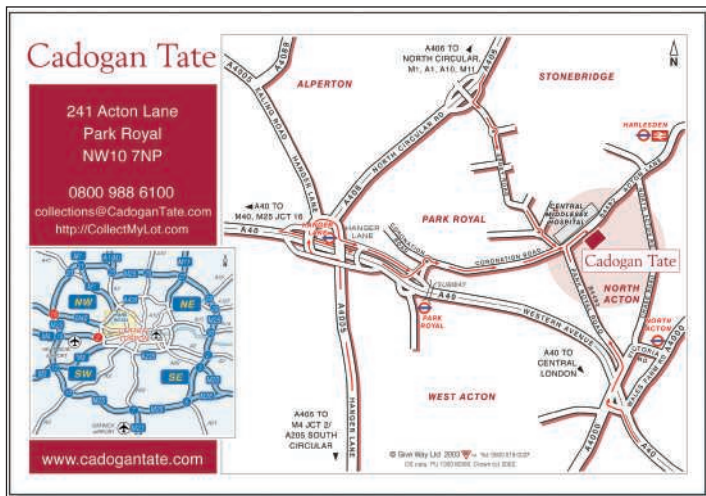
Christie's Post-Sale Service can organise local deliveries or international freight. Please contact them on +44 (0)20 7752 3200 or PostSaleUK@christies.com. To ensure that arrangements for the transport of your lot can be finalised before the expiry of any free storage period, please contact Christie's Post-Sale Service for a quote as soon as possible after the sale.

PHYSICAL LOSS & DAMAGE LIABILITY

Christie's will accept liability for physical loss and damage to sold **lots** whilst in storage. Christie's liability will be limited to the invoice purchase price including buyers' premium. Christie's liability will continue until the **lots** are collected by you or an agent acting for you following payment in full. Christie's liability is subject to Christie's Terms and Conditions of Liability posted on www.christies.com.

ADMINISTRATION FEE, STORAGE & RELATED CHARGES		
CHARGES PER LOT	LARGE OBJECTS E.g. Furniture, Large Paintings & Sculpture	SMALL OBJECTS E.g. Books, Luxury, Ceramics, Small Paintings
1-30 days after the auction	Free of Charge	Free of Charge
31st day onwards: Administration Fee	£70.00	£35.00
Storage per day	£8.00	£4.00
Loss & Damage Liability	Will be charged on purchased lots at 0.5% of the hammer price or capped at the total storage charge, whichever is the lower amount.	

All charges are subject to VAT.
Please note that there will be no charge to clients who collect their lots within 30 days of this sale.
Size to be determined at Christie's discretion.



COLLECTION FROM CADOGAN TATE LTD

Please note that Cadogan Tate Ltd's opening hours are Monday to Friday 9.00 am to 5.00 pm and lots transferred to their warehouse are not available for collection at weekends.

Cadogan Tate Ltd's Warehouse
241 Acton Lane,
Park Royal,
London NW10 7NP



A rare Afsharid Ptolemaic planetary model made for Mirza Mehdi Khan Astarabi, signed Muhammad Husayn Munajjim, Iran, dated AH 1155/1743-44 AD
Largest globe 7 $\frac{7}{8}$ in. (20 cm.) diam.
£80,000-120,000

ART OF THE ISLAMIC AND INDIAN WORLDS

London, King Street, 20 October 2016

VIEWING

14-19 October 2016
8 King Street
London SW1Y 6QT

CONTACT

Sara Plumbly
splumbly@christies.com
+44 (0)20 7389 2374



CHRISTIE'S



English 3-inch Pocket Globe by James Mynde, c.1810;
Hand-coloured woodcut world map by Sebastian Munster, c.1550

MAPPING THE GLOBE

<http://www.christies.com/scienceonline>

Online Auction, 1–10 November 2016

CONTACT

James Hyslop
jhyslop@christies.com
+44 (0)20 7752 3205



CHRISTIE'S

SCIENCE & NATURAL HISTORY
WEDNESDAY 19 OCTOBER 2016 AT 10.30 AM

85 Old Brompton Road, London SW7 3LD

CODE NAME: CELESTITE
SALE NUMBER: 12052

(Dealers billing name and address must agree with tax exemption certificate. Once issued, we cannot change the buyer's name on an invoice or re-issue the invoice in a different name.)

BID ONLINE FOR THIS SALE AT CHRISTIES.COM

BIDDING INCREMENTS

Bidding generally starts below the **low estimate** and increases in steps (bid increments) of up to 10 per cent. The auctioneer will decide where the bidding should start and the bid increments. Written bids that do not conform to the increments set below may be lowered to the next bidding interval.

UK£50 to UK £1000	by UK£50s
UK£1,000 to UK£2,000	by UK£100s
UK£2,000 to UK£3,000	by UK£200s
UK£3,000 to UK£5,000	by UK£200, 500, 800 (eg UK£4,200, 4,500, 4,800)
UK£5,000 to UK£10,000	by UK£500s
UK£10,000 to UK£20,000	by UK£1,000s
UK£20,000 to UK£30,000	by UK£2,000s
UK£30,000 to UK£50,000	by UK£2,000, 5,000, 8,000 (eg UK£32,200, 35,000, 38,000)
UK£50,000 to UK£100,000	by UK£5,000s
UK£100,000 to UK£120,000	by UK£10,000s
Above UK£200,000	at auctioneer's discretion

The auctioneer may vary the increments during the course of the auction at his or her own discretion.

- I request Christie's to bid on the stated **lots** up to the maximum bid I have indicated for each **lot**.
- I understand that if my bid is successful, the amount payable will be the sum of the **hammer price** and the **buyer's premium** (together with any taxes chargeable on the **hammer price** and **buyer's premium** and any applicable Artist's Resale Royalty in accordance with the Conditions of Sale – Buyer's Agreement). The **buyer's premium** rate shall be an amount equal to 25% of the **hammer price** of each **lot** up to and including £100,000, 20% on any amount over £100,000 up to and including £2,000,000 and 12% of the amount above £2,000,000. For wine and cigars there is a flat rate of 17.5% of the **hammer price** of each **lot** sold.
- I agree to be bound by the Conditions of Sale printed in the catalogue.
- I understand that if Christie's receive written bids on a **lot** for identical amounts and at the auction these are the highest bids on the **lot**, Christie's will sell the **lot** to the bidder whose written bid it received and accepted first.
- Written bids submitted on 'no reserve' **lots** will, in the absence of a higher bid, be executed at approximately 50% of the **low estimate** or the amount of the bid if it is less than 50% of the **low estimate**. I understand that Christie's written bid service is a free service provided for clients and that, while Christie's will be as careful as it reasonably can be, Christie's will not be liable for any problems with this service or loss or damage arising from circumstances beyond Christie's reasonable control.

Auction Results: +44 (0)20 7839 9060

WRITTEN BIDS FORM CHRISTIE'S LONDON

WRITTEN BIDS MUST BE RECEIVED AT LEAST 24 HOURS BEFORE THE AUCTION BEGINS.

CHRISTIE'S WILL CONFIRM ALL BIDS RECEIVED BY FAX BY RETURN FAX. IF YOU HAVE NOT RECEIVED CONFIRMATION WITHIN ONE BUSINESS DAY, PLEASE CONTACT THE BID DEPARTMENT: TEL: +44 (0)20 7752 3225 • FAX: +44 (0)20 7581 1403 • ON-LINE WWW.CHRISTIES.COM

12052

Client Number (if applicable) Sale Number

Billing Name (please print)

Address

Postcode

Daytime Telephone Evening Telephone

Fax (Important) E-mail

Please tick if you prefer not to receive information about our upcoming sales by e-mail

I have read and understood this written bid form and the Conditions of Sale – Buyer's Agreement

Signature

If you have not previously bid or consigned with Christie's, please attach copies of the following documents. Individuals: government-issued photo identification (such as a driving licence, national identity card, or passport) and, if not shown on the ID document, proof of current address, for example a utility bill or bank statement. Corporate clients: a certificate of incorporation. Other business structures such as trusts, offshore companies or partnerships; please contact the Compliance Department at +44 (0)20 7839 9060 for advice on the information you should supply. If you are registering to bid on behalf of someone who has not previously bid or consigned with Christie's, please attach identification documents for yourself as well as the party on whose behalf you are bidding, together with a signed letter of authorisation from that party. New clients, clients who have not made a purchase from any Christie's office within the last two years, and those wishing to spend more than on previous occasions will be asked to supply a bank reference. We also request that you complete the section below with your bank details:

Name of Bank(s)

Address of Bank(s)

Account Number(s)

Name of Account Officer(s)

Bank Telephone Number

PLEASE PRINT CLEARLY

Lot number (in numerical order)	Maximum Bid £ (excluding buyer's premium)	Lot number (in numerical order)	Maximum Bid £ (excluding buyer's premium)

If you are registered within the European Community for VAT/IVA/TVA/BTW/MWST/MOMS
 Please quote number below:

CATALOGUE SUBSCRIPTIONS

EXPERT KNOWLEDGE BEAUTIFULLY PRESENTED

BOOKS & SCIENCE

Books and manuscripts including Medieval and Renaissance illuminated manuscripts, early printing, literature, modern first editions, atlases and travel, natural history and autograph manuscripts. Scientific instruments, globes, maps, fossils, minerals specimens and meteorites.



Code	Subscription Title	Location	Issues	UK£Price	US\$Price	EURPrice
Books, Travel & Science						
L20	Books & Manuscripts	London	6	114	183	171
N20	Books & Manuscripts	New York	3	70	114	108
P20	Books & Manuscripts	Paris	2	38	61	57
P21	Bande Dessinée	Paris	1	20	32	30
K141	Science & Natural History	South Kensington	2	29	48	44
W20	Books Worldwide (includes L20, N20, P20)	Worldwide	11	200	320	300

CHRISTIE'S

WWW.CHRISTIES.COM/SHOP

Photographs, Posters and Prints · Impressionist and Modern Art
 Jewellery, Watches and Wine · Antiquities and Tribal Art
 Asian and Islamic Art · Russian Art
 Furniture, Decorative Arts and Collectables · American Art and Furniture
 Books and Science · Design, Costume and Memorabilia
 Post-War and Contemporary Art
 Old Master Paintings and 19th Century Paintings

CHRISTIE'S

CHRISTIE'S INTERNATIONAL PLC

Patricia Barbizet, Chairwoman and CEO
Jussi Pylkkänen, Global President
Stephen Brooks, Deputy CEO
Loïc Brivezac, Gilles Erulin, Gilles Pagniez,
Héloïse Temple-Boyer,
Sophie Carter, Company Secretary

CHRISTIE'S EXECUTIVE

Patricia Barbizet, Chairwoman and CEO
Jussi Pylkkänen, Global President
Stephen Brooks, Deputy CEO

INTERNATIONAL CHAIRMEN

François Curiel, Chairman, Asia Pacific
Stephen Lash, Chairman Emeritus, Americas
Viscount Linley, Honorary Chairman, EMERI
Charles Cator, Deputy Chairman, Christie's Int.
Xin Li, Deputy Chairwoman, Christie's Int.

CHRISTIE'S EMERI

SENIOR DIRECTORS

Mariolina Bassetti, Giovanna Bertazzoni,
Edouard Boccon-Gibod, Prof. Dr. Dirk Boll,
Olivier Camu, Roland de Lathuy,
Eveline de Proyart, Roni Gilat-Baharaff,
Francis Outred, Christiane Rantzauf,
Andreas Rumbler, François de Ricqlès,
Jop Ubbens, Juan Varez

ADVISORY BOARD

Pedro Girao, Chairman,
Patricia Barbizet, Arpad Busson, Loula Chandris,
Kemal Has Cingillioglu, Ginevra Elkann,
I. D. Fürstin zu Fürstenberg, Laurence Graff,
H.R.H. Prince Pavlos of Greece,
Marquesa de Bellavista Mrs Alicia Koplowitz,
Viscount Linley, Robert Manoukian,
Rosita, Duchess of Marlborough,
Countess Daniela Memmo d'Amelio,
Usha Mittal, Çiğdem Simavi



CHRISTIE'S UK

CHAIRMAN'S OFFICE

Orlando Rock, Chairman
Noël Annesley, Honorary Chairman;
Richard Roundell, Vice Chairman;
Robert Copley, Deputy Chairman;
The Earl of Halifax, Deputy Chairman;
Francis Russell, Deputy Chairman;
Julia Delves Broughton, James Hervey-Bathurst,
Amin Jaffer, Nicholas White, Mark Wrey

SENIOR DIRECTORS

Simon Andrews, Jeremy Bentley, Ellen Berkeley,
Jill Berry, Peter Brown, James Bruce-
Gardyne, Sophie Carter, Benjamin Clark,
Christopher Clayton-Jones, Karen Cole,
Paul Cutts, Isabelle de La Bruyere, Leila de Vos,
Paul Dickinson, Harriet Drummond,
Julie Edelson, Hugh Edmeades, David Elswood,
David Findlay, Margaret Ford, Edmond Francey,
Daniel Gallen, Karen Harkness, Philip Harley,
James Hastie, Karl Hermanns, Paul Hewitt,
Rachel Hidderley, Mark Hinton, Nick Hough,
Michael Jeha, Donald Johnston,
Erem Kassim-Lakha, Nicholas Lambourn,
William Lorimer, Catherine Manson,
Nic McElhatton (Chairman, South Kensington),
Nicholas Orchard, Clarice Pecori-Giraldi,
Benjamin Peronnet, Henry Pettifer, Steve Phipps,
Will Porter, Paul Reason, Tara Rastrick,
Amjad Rauf, William Robinson, Tim Schmelcher,
John Stainton, Alexis de Tiesenhausen,
Lynne Turner, Jay Vinze, Andrew Ward,
David Warren, Andrew Waters, Harry Williams-
Bulkeley, Martin Wilson, André Zlattinger

DIRECTORS

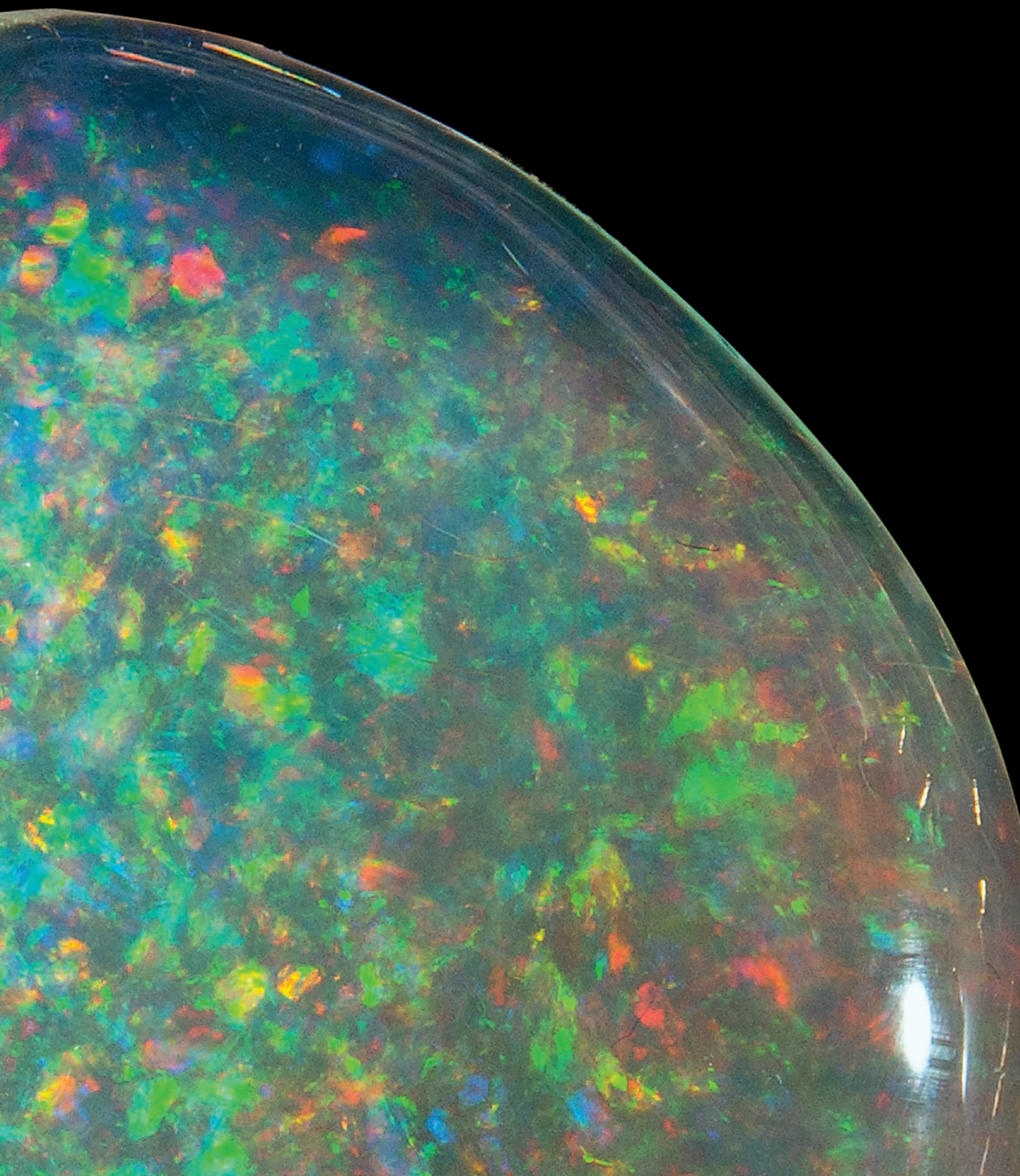
Zoe Ainscough, Cristian Albu, Marco Almeida,
Maddie Amos, Katharine Arnold, Alexis Ashot,
Alexandra Baker, Helen Baker, Karl Barry,
Rachel Beattie, Sven Becker, Jane Blood,
Piers Boothman, David Bowes-Lyon,
Lucy Brown, Robert Brown, Lucy Campbell,
Jason Carey, Sarah Charles, Romilly Collins,
Ruth Cornett, Nicky Crosbie, Armelle de Laubier-
Rhally, Eugenio Donadoni, Sophie DuCret,
Christopher O'Neil-Dunne, Anna Evans,
Arne Everwijn, Adele Falconer, Nick Finch,
Emily Fisher, Peter Flory, Elizabeth Floyd,
Nina Foote, Christopher Forrest, Giles Forster,
Zita Gibson, Alexandra Gill, Keith Gill,
Simon Green, David Gregory, Mathilde Heaton,
Annabel Hesketh, Sydney Hornsby,
Peter Horwood, Kate Hunt, Simon James,
Sabine Kegel, Hans-Peter Keller, Tjabel Klok,
Robert Lagneau, Joanna Langston, Tina Law,
Adriana Leese, Tom Legh, Brandon Lindberg,
Laura Lindsay, David Llewellyn,
Murray Macaulay, Graeme Maddison,
Sarah Mansfield, Nicolas Martineau,
Roger Massey, Joy McCall, Neil McCutcheon,

Michelle McMullan, Daniel McPherson,
Neil Millen, Jeremy Morgan, Leonie Moschner,
Giles Mountain, Chris Munro, Liberte Nuti,
Beatriz Ordovás, Rosalind Patient, Anthea Peers,
Keith Penton, Romain Pinganaud,
Sara Plumbly, Anne Qaimmaqami,
Marcus Rådecke, Pedram Rasti, Lisa Redpath,
Suzuko Roberts, Sandra Romito, Tom Rooth,
Alicé de Roquemareul, Francois Rothlisberger,
Patrick Saich, Rosemary Scott, Tom Scott,
Nigel Shorthouse, Dominic Simpson, Nick Sims,
Clementine Sinclair, Sonal Singh, Katie Siveyer,
Nicola Steel, Kay Sutton, Cornelia Svedman,
Rakhi Talwar, Thomas Venning, Edwin Vos,
Amelia Walker, Ben Wiggins, Sophie Wiles,
Bernard Williams, Georgina Wilsenach,
Toby Woolley, Geoff Young

ASSOCIATE DIRECTORS

Guy Agazarian, Jennie Amos,
Ksenia Apukhtina, Fiona Baker, Carin Baur,
Sarah Boswell, Mark Bowis, Phill Brakefield,
Clare Bramwell, Jenny Brown, David Cassidy,
Marie-Louise Chaldecott, John Crook,
Helen Culver Smith, Laetitia Delaloye,
Charlotte Delaney, Milo Dickinson,
Freddie De Rougemont, Grant Deudney,
Howard Dixon, Virginie Duluccq, David Ellis,
Antonia Essex, Kate Flitcroft, Eva French,
Pat Galligan, Elisa Galuppi, Leonie Grainger,
Julia Grant, Pippa Green, Angus Granlund,
Christine Haines, Coral Hall, Charlotte Hart,
Daniel Hawkins, Evelyn Heathcoat Amory,
Anke Held, Valerie Hess, Carolyn Holmes,
Amy Huitson, Adrian Hume-Sayer, James Hyslop,
Helena Ingham, Pippa Jacomb, Guady Kelly,
Hala Khayat, Alexandra Kindermann,
Julia Kiss, Polly Knewstub, Mark Henry Lampé,
Aoife Leach, Rob Leatham, Antoine Leboutteiller,
Timothy Lloyd, Peter Mansell,
Stephanie Manstein, Amparo Martinez Rusotto,
Astrid Mascher, Georgie Mawby,
David McLachlan, Lynda McLeod,
Kateryna Merkalenko, Toby Monk,
Rosie O'Connor, Samuel Pedder-Smith,
Christopher Petre, Louise Phelps, Eugene Pooley,
Sarah Rancans, David Rees, Alexandra Reid,
Sarah Reynolds, Meghan Russell, Pat Savage,
Julie Schutz, Hannah Schweiger, Angus Scott,
Ben Slinger, James Smith, Graham Smithson,
Mark Stephen, Annelies Stevens,
Charlotte Stewart, Dean Stimpson,
Gemma Sudlow, Dominique Suiveng,
Keith Tabley, Iain Tarling, Sarah Tennant,
Timothy Triptree, Lucia Tro Santafe,
Flora Turnbull, Paul van den Biesen,
Mieke Van Embden, Ben Van Rensburg,
Lisa Varsani, Shanthi Veigas, Julie Vial,
Assunta Grafín von Moy, Anastasia von Seibold,
Zelie Walker, Tony Walshe, Gillian Ward,
Chris White, Rosanna Widen, Annette Wilson,
Julian Wilson, Miriam Winsón-Alío, Elissa Wood,
Suzanne Yalcin-Pennings, Charlotte Young







CHRISTIE'S

85 OLD BROMPTON ROAD LONDON SW7 3LD